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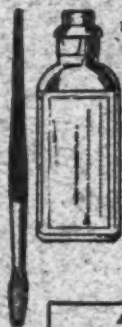
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No. 6

A PETITION IN BANKRUPTCY

In the accompanying illustration there is an easily understood and important lesson, namely, that nature eventually puts an extinguisher on anything that has outlived usefulness. Four of the animals shown here—the dodo, the dinosaur, the plesiosaurus and the mammoth—belong to an age long past, and the causes of their extinction are summed up in one word—"bankrupt."

But the animal in the center of the picture, the scrub bull, is of our own times. No effort of the imagination is needed to picture the scrub; no veil of time hides him from our sight; and there is no place for poetry or romance in the recital of his history. There may be room for speculation, interesting if not profitable, about the mammoth, as to what manner of creature he was and what his uses were, when he roamed the earth. But no roseate tinge adds beauty to the scrub. He is touched only by cold, stern, and unlovely facts. And some of them are these:

The scrub bull is wholly lacking in the qualities necessary for the production of high-class stock, and he is grossly inefficient at a time when the highest efficiency is needed.

Such are the short and simple annals of the American scrub bull.

But the future looks bright. Hundreds of intelligent farmers

BANKRUPTS OF NATURE

They couldn't stand competition
or meet human requirements.

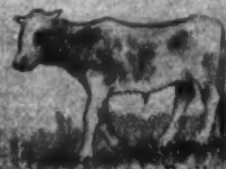


Dinosaur - long extinct



The Dodo - long extinct

Should be extinct in the
United States about 1925.
Variety - Bologna. (taurus)
Replaced by good purebreds.



Scrub Bull



Plesiosaurus - long extinct



Mammoth
long extinct

Useless Animals in Time Become Extinct
Have you any of these on your farm ?

"Better Sires - Better Stock"



and stockmen are already at work in coöperation with their States and the Government in its "Better Sires—Better Stock" campaign to eliminate not only scrub bulls but all scrub sires from American herds. The day of the purebred sire is at hand, and his coming means instant and steady improvement in livestock conditions in America. There are difficulties to be overcome, but the American stockman is equal to the task. Before many years it will be said of the scrub sire, as it is now said of the dinosaur and the mammoth, that it became extinct because it was one of "nature's bankrupts and could not meet human requirements." And all veterinarians who have pride in American progress and leadership will do what they can to make the saying literally true.

WHAT CONSTITUTES A SURGEON?

The *Journal of the American Medical Association* cites a medico-legal case in which the Springfield, Mo., Court of Appeals says that the word "surgeon," unqualified, in the mind of the ordinary individual, means one possessed of such knowledge of the human body, and such other knowledge as the laws of our land require, and possessed of such skill in the use of instruments, that he may be expected with reason to correct or relieve some unnatural condition of the human body. The court does not think that the mass of mankind would connect the idea of a veterinarian with the word "surgeon," as that word is generally used. In the case before the court, an accident insurance policy provided, among other things, that the insurer, the defendant, would be liable in the event that a legally qualified physician or surgeon, while holding a necropsy or performing a surgical operation, actually cut or wounded himself, and by reason of such cutting or wounding and simultaneously therewith was inoculated with poison. The insured was a veterinarian, who, while vaccinating some hogs and while endeavoring to slit the ear of one to show that it had been treated, accidentally cut his finger, from which blood poisoning resulted, causing his death. The plaintiff, who was the beneficiary under the policy, contended that the insured was a "surgeon," and that the operation which he was performing when injured was a "surgical operation," as those terms were used in this provision of the policy. The court, however, holds otherwise and reverses a judgment that was obtained by the plaintiff against the defendant insurer.

RINDERPEST CAUSING HAVOC

Readers of recent news articles reporting the destruction of cattle in European countries by cattle plague are making inquiry regarding the nature of this disease.

It is not strange that cattle plague, known in veterinary literature as rinderpest, should be unfamiliar to those interested in our livestock industry, as fortunately, it never has appeared in the United States.

As the name signifies, it is a veritable cattle plague. Prior to the great world war, it had been driven back from Europe, but today it is ravaging the herds of several of the European countries which were involved in the recent war, although the Belgians appear to have eradicated it from their country. In this respect history is repeating itself, for extension of the disease into Europe from Asia in previous years has been associated with the great wars; cattle, accompanying troops having acted as disseminators of the infection. Thus, if for no other reason, we may credit the reports that the Bolshevik army, by driving diseased cattle ahead of their forces, has spread rinderpest among the cattle of Poland to such an extent that it threatens almost complete destruction of Polish herds.

The symptoms of rinderpest are fairly characteristic. However certain appearances which are observed in one epizootic may be absent in another. Among the first signs, however, is a very high fever. Repeated chills may be observed. The animal manifests great debility. The head droops and rests on some object for support. The hair stands on end and the muzzle is dry. In dairy cows the secretion of milk diminished very rapidly. The back is arched, and the four legs are brought together under the body. As the disease progresses, the mucous membranes become reddened; diarrhea soon sets in, and the discharges become fetid, viscid and streaked with blood. Coughing is a common symptom and ulcers, or erosions, may appear in the mouth followed by sloughing. There may also be sloughing of the skin in various portions of the body. In severe cases, which are the most common in the susceptible cattle of western Europe, death ensues four to seven days after the first appearance of the disease and is preceded by great emaciation and debility.

What are the possibilities of rinderpest being introduced into the United States? While the disease may be spread by the raw products of affected animals, in most instances it is disseminated by infected animals, in the ordinary traffic with cattle. Cattle are highly susceptible to the disease. Sheep, goats, deer, and camels are also sus-

ceptible. None of these animals can be imported into the United States from countries across seas without a permit from the Secretary of Agriculture, and permits are not issued for importations from countries in which rinderpest exists. This eliminates the chief source of danger.

Under regulations issued jointly by the Department of Agriculture and the Treasury Department, importation into the United States of any animal by-products taken or removed from animals affected with anthrax, foot-and-mouth disease, or rinderpest is prohibited. Hides of neat cattle, calfskins, buffalo hides, sheepskins, goatskins, and deerskins offered for entry into the United States must be subjected to disinfection in an approved manner, unless it can be shown that rinderpest does not exist in the locality where the shipment originated. Thus every possible effort is being made to protect the livestock of the United States from cattle plague of the old world.

OFFICIAL ROUTE TO DENVER

After consultation with President White, the Chicago, Burlington and Quincy has been selected as the official route from Chicago to Denver, to the meeting of the A. V. M. A. September 5 to 9, 1921.

The advantage of having an official route is that it will enable the members that are going from the east to go on the same train from Chicago to Denver. The Burlington is one of the best routes to Denver and gave the association excellent service in 1915 on the trip to San Francisco.

If one hundred and twenty-one passengers can be secured for this trip, a special train will be run from Chicago.

A NEW VETERINARY COLLEGE PROPOSED

The Minnesota Veterinary Medical Association at the Austin meeting last July, memorialized the University Board of Regents to establish a Veterinary College at University Farm. Again at the annual meeting in January, 1921, the resolution committee reported a resolution that received the unanimous support of the association for the legislative committee to use all its resources to further this matter.

In view of these facts, a bill has been introduced into the State Senate known as Senate File 162, to create a Veterinary College at the University.

**BOVINE COCCIDIOSIS IN BRITISH COLUMBIA, WITH
A DESCRIPTION OF THE PARASITE, EIMERIA
CANADENSIS SP. N.¹**

By E. A. BRUCE

*Animal Pathologist, Department of Agriculture of Canada, Agassiz,
British Columbia*

COCCIDIOSIS of cattle has been reported from a number of European countries and from several parts of the Tropics. In America definite reports of its occurrence appear to be confined to the States of Washington (Schultz, 1915), New Jersey (Smith and Graybill, 1917), Pennsylvania (Lentz, 1918) and New York (Way and Hagan, 1920). Schultz does not describe the coccidium seen in his cases, neither does Lentz nor Way and Hagan; but judging from the description given by Smith and Graybill it would appear that the same organism is not responsible for all cases of coccidiosis in cattle. This phase of the matter will be considered when the coccidium found in British Columbia cattle is under discussion.

The term coccidiosis does not necessarily imply infection by the genus *Coccidium* (more correctly *Eimeria*), this being only one of a large number of genera grouped under the order *Coccididea*; it is, however, the genus of the greatest economic importance.

The life cycle of these parasites is digenetic, and may be briefly stated as follows: Infection takes place through the ingestion by a suitable host of highly resistant oöcysts which are passed with the feces of an affected animal. Through the action of the intestinal juices (chiefly the pancreatic) the oöcyst wall dissolves and a number of sporozoites are liberated. Each sporozoite penetrates an epithelial cell and gives rise to a number of merozoites. A single merozoite invades a cell and emerges again as a number of merozoites; this may be repeated for several generations (schizogony). Suitable conditions supervening, a merozoite now invades a cell and gives rise to either a single female gamete or a number of male gametes (gametogony). After conjugation of a male and female gamete an oöcyst is formed inside of which spore and sporozoite formation goes on (sporogony).

The classification of the coccidia is based chiefly on the number of spores found in each oöcyst and the number of sporozoites found in each spore.

¹ Presented at the Fifty-seventh Annual Meeting of the American Veterinary Medical Association, Columbus, Ohio, August, 1920.

HISTORY

Four outbreaks have been known to occur in British Columbia, three being in the Kamloops district and one near Clinton. In addition, it seems probable that a few isolated cases treated by Dr. George of Kamloops were coccidial in nature, and that another ranch suffered loss in the Clinton district. No connection could be traced between the four outbreaks, which occurred in different years and from approximately 20 to 60 miles apart. It may be noted that these cases appeared in winter, and that the winter climate of the dry belt of British Columbia is by no means mild. At the time of the first outbreak the temperature was about 30° below zero, and 40° below during the fourth. No explanation can be offered as to why the disease should be more prevalent in the winter season, beyond the supposition that the necessary moisture for oöcystal development is not available until the first snowfall.

Outbreak No. 1.—Occurred in February, 1917, in a bunch of 430 head, about 66 per cent of which were under 3 years of age. Fully 100 were affected and 28 died. Only two definitely known to be over 3 years of age were affected, one of which succumbed. This outbreak is of particular interest as it was complicated by a mycosis which not only affected the intestinal tract but in some cases was generalized, even the spleen showing hyphæ. The mycelium was septate and tended to grow in the intestine in the form of clubs about 29 microns long by 3 microns at its widest end. In the spleen, liver, etc., it assumed the same shape but was not so large. The presence of this fungus was so general that it was not for some time after the trouble had abated that coccidia were found to be implicated, this being largely due to failure to examine the rectum. Some 3-year-old alfalfa in poor condition was suspected as being the cause of the mycosis, but unfortunately all efforts to cultivate the fungus were unavailing. The implicated hay was afterwards sold and fed to stock without bad results, which would tend to show that coccidia were the primary cause of the trouble. No opportunity was afforded to show a recurrence of the disease, as during the summer the owner sold all his cattle and bought sheep. The mortality in this outbreak would have undoubtedly been higher but for the fact that the feed was changed and the animals were moved to new ground each time they were fed.

Outbreak No. 2.—Occurred in January, 1918, in a herd of 1,500 head, the disease, however, being confined to three corrals containing 575 animals. Five hundred of those concerned were under one

year of age. Owing to the size of the herd it is difficult to state exactly the number affected, but 40 would be a conservative estimate. The first case was noticed on January 3, after the animals had been on their winter feeding grounds four weeks. At least two bulls rising 3 were affected, but the majority were calves about 10 months of age. Eleven deaths occurred, four of which were in yearlings, the balance being younger. Treatment, which was instituted on the 14th, proved most effective, only one calf dying after that date. The infected ground was ploughed, and no recurrence of the trouble has been reported.

Outbreak No. 3.—Occurred in March, 1919, in a herd of 108 head, 57 of which were under one year of age. Eight calves from 4 to 6 months of age affected, five of which died. Treatment as in the previous outbreak was recommended but was not used owing to influenza breaking out among the ranch employees at that time. Isolation and a change of feed were the only preventive measures adopted, but sick calves were attended to by local veterinarian.

Outbreak No. 4.—Was reported in the latter part of January, 1920, although the owner had lost two cattle before Christmas. Total herd, 160. The disease, however, was confined to a band of 50, all over one year of age with the one exception of a 7-months calf which had been kept separate from the main bunch of calves and from the band in question. About 16 out of the 50 visibly affected; six deaths (counting the two in December), one yearling, two two-year-olds, two three-year-olds, and one cow. This outbreak is interesting as the disease was confined (with the exception of one calf) to older animals. The calves were kept about half a mile from the older cattle, but it is surprising that infection was not carried to them via hay wagons, etc. Treatment as recommended in outbreak No. 2 was instituted; shortly after it was started one more case was seen; no more deaths occurred, and after two weeks' treatment the animals appeared healthy.

SYMPTOMS

Diarrhea, prior to which there may be constipation with mucus on the feces and even a little blood. Once diarrhea is established the characteristic feature is the presence of blood clots of various sizes mixed with mucus and small pieces of epithelium. A fetid odor is usually noted. The blood loss may be very heavy, and in the cases complicated by mycosis blood literally streamed from those affected. Diarrhea is usually of only a few days' duration, but even after its cessation the feces may be coated with mucus and contain

a little blood. In two experimentally infected animals blood was passed continuously for seven days, and in one of these could be noticed as late as the 218th day after having been first noticed.

In chronic cases the feces show that the food is not being properly assimilated, and the animals become emaciated and anemic. Straining may be so severe as to cause prolapse of the rectum. Symptoms of colic are absent, but grinding of the teeth has been noticed. In severe cases the appetite is affected and emaciation is rapid.

The majority show very little, if any, fever. The highest temperature recorded was in an experimentally affected animal, viz, 103.7. It is possible that higher temperatures may occur, but in the majority of cases such are undoubtedly due to secondary invasion. Before death the temperature may be subnormal.

A prominent feature in these cases was that with one possible exception all fatal cases were preceded by fits. Death occurs in from 8 to 24 hours after first showing fits, the animal dying in convulsions. Fatal cases usually die in from two to five days after the first symptoms are noticed.

The fits mentioned (which are no doubt due to cerebral anemia) occur at varying intervals; one cow was observed to have three when being driven a distance of 50 yards. They appear to be induced when the animal is disturbed, and may be described as follows: The animal appears frightened, staggers, may brace itself by resting the head on the ground with the front legs widely spread, falls over, and froths a little at the mouth; in a little more or less (usually less) than a minute it gets up and acts as if nothing had happened.

Only one animal is definitely known to have recovered after having had one of these fits.

Death may occur when the diarrhea is abating.

INCUBATION

Assuming incubation to mean the time elapsing between infection and the first appearance of blood or oöcysts in the feces, this has been found experimentally to be about 14 days.

DIAGNOSIS

Under the heading of diagnosis it will be necessary to consider several statements made by Schultz in his articles on coccidiosis in the March, 1916, and September, 1918, numbers of the JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION.

In the first-mentioned article, in which it is inferred that coccidiosis and rinderpest are synonymous, after describing several ex-

periments that took place in the Philippines with rinderpest blood, we find the statement: "The experiments described above show that coccidiosis can readily be transmitted by blood inoculations * * *." In these animals which subsequently showed coccidia in their feces, it can be assumed that they harbored such parasites prior to injection, and that the coccidia remained more or less latent until the animal's resistance was broken down by an attack of rinderpest. Negative results were obtained at Agassiz when blood from coccidia-infected cattle was injected subcutaneously or intrajugularly (see under "Experiments"). The high temperatures (up to 107°) described by Schultz in the initial stages of coccidiosis do not coincide with any cases seen in British Columbia. In my opinion when high temperatures exist they are due to secondary invasion. No coccidia have been found in discharges from the eyes or nose as recorded by Schultz.

Great stress is laid by Schultz on the presence in fecal matter of schizogonic forms. No such forms have been identified by me in such matter. In this connection it is significant to note that Smith and Graybill were unable to find any schizonts or merozoites in slides submitted to them by Schultz, only desquamated epithelium being found, notwithstanding the fact that schizogonic forms were supposed to be present.

The diagnostic agent *par excellence* is the oöcyst, yet we find the following statement is made: "The fertile, encapsulated forms that alone can infect pastures or cause the disease in susceptible animals are not formed in animals that perish, but in those that recover." This is certainly not in accordance with our experience in British Columbia, not only in connection with coccidiosis of cattle, but also of rabbits and fowl.

Finally, in so far as Schultz's articles are concerned, it is stated that "red dysentery in cattle is caused by *Coccidium oviforme*." While there may be several species of coccidia parasitic in the bovine, *C. oviforme* is not one of them. This coccidium, more correctly known as *Eimeria stiedae*, is the common coccidium of the rabbit and is not infective for cattle.

A definite diagnosis is not possible without recourse to the microscope. The hemorrhagic diarrhea, usually following a period of constipation, rapid emaciation, lack of high temperatures, and convulsions, would suggest the disease.

When coccidia could not be detected readily in the feces the following method was used: Feces were diluted with an equal quantity of water, strained through a fine wire screen and then through

several thicknesses of cheesecloth; if necessary this was repeated a second time; the resulting mixture was then centrifuged for several minutes, the excess of fluid poured off and the residue examined. The oöcysts can be seen nicely with a dry high-power objective, but for preference a 2-inch ocular and an oil immersion lens were used. They should be examined in a moist condition and without recourse to staining.

During the course of the work three different species of flagellates and an ameba were seen. In one animal, a calf, two specimens of a *Balantidium* were noticed; these measured 126 by 89.5 microns. The author is not aware that any species of *Balantidium* have been reported heretofore as occurring in bovines. The cystic forms of flagellates, eggs of small worms, certain fungi, yeast cells, and other debris can cause a great deal of trouble to the uninitiated.

AUTOPSY

In the majority of cases the rectum shows the greatest changes; its mucosa is swollen, corrugated, hemorrhagic and covered with mucus. In severe cases it may be edematous. The contents are soft and contain blood, mucus and shreds of epithelium. The large intestines may show some inflammatory changes, but to a much lesser extent than the rectum. The small intestines show a catarrhal inflammation, and may, especially in young animals, be hemorrhagic. Some congestion may be seen around the ileo-cecal valve and the pyloric end of the abomasum. Occasionally the mucous membrane of the abomasum shows eroded areas. Necrotic processes due to a secondary invasion may upon rare occasions be seen in the large intestines, and small pin-point yellowish spots may occur in the small intestines.

The mesenteric lymphatics are swollen, but seldom show any hemorrhages. The spleen usually has a dry, bloodless appearance, and the other organs appear normal; the lungs and kidneys may, however, show some congestion.

The crypts of Lieberkuhn are the chief seat of the coccidia, but the intertubular tissue is also invaded. All the cells in a tubule may be affected while neighboring tubules remain healthy. Even when the rectum is extensively invaded it may be difficult to find any coccidia in the small intestines; however, in the youngest animals the small intestine is found to be affected to a greater extent than the large, the greatest changes being found in the ileum. No invasion of the lymphatic glands was seen, neither were any coccidia found in the abomasum.

The blood shows poikilocytosis and some polychromasia, but a polynuclear leucocytosis as reported by Meyer and Crocker and by Fantham in birds was not seen. A count of four affected cattle was as follows: Total monos, 72.12; polys, 21.33; eosins, 6.41; mast, 0.12.

The parasite invariably destroys its host cell completely, but does not appear to have any deleterious action on neighboring cells.

TREATMENT

Treatment as outlined in the various text-books is not applicable to an extensive outbreak or to range animals. Such being the case, it was decided to try the following: Sulphate of iron 2 parts, sulphur 2 parts, salt 6 parts. Of this mixture 50 pounds was fed with 100 pounds of linseed oil-cake meal to 100 head per day. This was placed in troughs to which the animals had free access. The results obtained were most gratifying (see Outbreaks Nos. 2 and 4). Medication should be continued for two weeks.

Of other treatments recently recommended may be mentioned the use of thymol, 10 to 15 grams daily, by Sanlorenzo in Italy. It meets with the usual objection, however, that of being unsatisfactory when dealing with range animals. The author has not tried thymol on cattle, but has used it on fowl, but with only partial success.

Dobell (1919) in his article on "The Coccidia of Man" says: "No method of treatment has yet been discovered which will get rid of an *Isospora* infection, or, for that matter, of any coccidial infection in any animal."

In the face of such a statement no specific value can be attributed to the somewhat empirical mixture used. The fact remains, however, that good results followed its use, and the author has no hesitancy in recommending it for coccidiosis of cattle.

Owing to the self-limitation of the disease many cases recover spontaneously. However, there can be no doubt that if an animal can be helped over the acute stage its chance of recovery is enhanced. Such a necessary fillip appears to have been supplied by the use of the linseed-meal mixture mentioned above.

Sick animals should be isolated so that proper disposal can be made of their feces, as the oöcysts are highly resistant. Some kept under unsatisfactory conditions in this laboratory were infective for 13 months, and Fantham has shown that the oöcysts of *Eimeria avium* are infective for 2 years after being passed. The use of ordinary antiseptics is useless, lime being probably the best and most

convenient agent for their destruction. Infected pastures should be treated with some form of lime and then deeply ploughed.

PATHOGENESIS

On one ranch prior to my visit the carcasses of the dead cattle were fed to the hogs, of which there were quite a number. These hogs ate practically everything but the bones. The amount of oöcysts ingested must have been enormous, but none of the hogs showed the slightest indisposition. (It is possible that in this instance none of the oöcysts ingested had developed sporozoites and therefore they were non-infective; the fact is, however, given for what it is worth.)

A band of horses had the run of an infected yard, also three sheep; in addition a sheep was kept in the same yard as two experimentally infected animals. None of these showed any symptoms. Chickens were allowed the run of an infected yard, and guinea-pigs, rabbits, white rats and fowls were dosed with infective material, with negative results.

The coccidium therefore is evidently not infective for horses, pigs, sheep, rabbits, guinea-pigs, white rats and domestic fowls, but produces dysentery in cattle of all ages (experimental animals from 1 month to an aged cow, and in the field from 4 months to an aged cow). Younger animals suffer the most and death often results. Three-year-old animals have, however, been known to succumb, and in one instance an aged cow died.

EXPERIMENTS

January 16, 1918, two guinea-pigs and three rats were fed the rectal mucosa from a coccidia-infected calf, with negative results.

Calf 1.—January 18, 1918, injected 1.5 c.c. of citrated blood from a case of coccidiosis into the jugular of a 10-months calf, also 2.5 c.c. subcutaneously into a 3-year-old heifer (heifer 2). Beyond a slight rise in temperature the results were negative. February 7, 1918, calf 1 was drenched with approximately three-quarters of an ounce of infected feces collected January 14. February 21, 14 days after drenching, blood was passed with the feces, and a large number of oöcysts were found. This animal passed blood for seven days. No blood was noticed in the feces after that date, but the incessant wet weather and pressure of other work prevented a definite record being kept. The temperature varied from 101 to 103.4. On August 12 this calf was killed, as it had become emaciated and anemic, but no coccidia were found on autopsy.

Heifer 2.—March 12, 1918, drenched with about 1 ounce of feces passed by calf 1 on or about March 9. On the 21st mucus was seen on the dung, also on the 24th. On the 27th, the fifteenth day, blood was noticed and was passed for seven days. The temperature varied from 101 to 102.4. Blood was also seen on April 23 and 24 and on May 5, also August 10, September 5 and October 31. The last date when an oöcyst was found was August 10, this being the only time that an oöcyst containing fully developed sporocysts was found in fresh feces in any animal examined. This animal subsequently made an uneventful recovery.

Calf 3.—This calf, aged 3 months, was placed on August 9 in the yard in which Nos. 1 and 2 were confined when ill. On September 6 coccidia were found in the feces; on the 8th diarrhea was marked, on the 9th the animal looked very weak, temperature 103.4; on the 14th, temperature 103.7. The first visible blood was not seen until the 16th. On the 20th the temperature was 103, but the following day was 101.4. The calf being very weak and emaciated, it was killed. This animal became infected naturally, after being exposed two weeks. The case was very much complicated by an ameba.

Cow 4.—Owing to the apparent resistance of older cattle, it was decided to try an experiment on such an animal. On April 11, 1919, an aged cow was given a heavy dose of oöcysts in which sporozoite development was general, and on April 21 a similar dose was given. On May 2 a little blood was passed and oöcysts were found. On May 4 was dosed again. No more blood was noticed on the feces, and the animal appeared normal.

Calf 5.—Age about 1 month. On September 3 was given about 1 c.c. of centrifuged feces collected March 21, 1919, in which very few oöcysts showed sporozoites. On the 9th another small dose was given. On the 13th mucus was noticed on the feces. On the 17th a little blood was seen, but no oöcysts were found, although it is probable that a prolonged search would have demonstrated their presence, as on the following day they were found in abundance. Diarrhea showed on the 19th, but only lasted for a couple of days. On the 28th blood and oöcysts were found. Given another small drench with but few sporozoites. October 3, oöcysts and blood were seen under the microscope. A few oöcysts and a little blood were noticed between that date and the 16th, when it was decided to kill the animal, as specimens of the intestine were desired before the disease reached its height. The temperature remained normal.

The initial dose (and subsequent doses) used on this calf was so poor in sporozoites that it was feared that clinical symptoms might not result; however, blood was noticed on the fourteenth day, thus confirming the incubation period seen in calf 1 and heifer 2. This was the youngest animal seen affected, and was especially interesting on account of the heavier infection of the small intestines as compared with older animals.

Calf 6.—In order to check the heavy infestation of the small intestine noticed in calf 5, a 5½-months-old calf was dosed January 12, 1920, with ¼ c.c. of centrifuged feces from calf 5. On the 26th, 14 days after drenching, diarrhea was not evident, but the feces were softer and contained a little blood and a number of oöcysts. On the 28th the dung was still softer but there was no true diarrhea. Given another ¼ c.c. dose. The dung subsequently showed the presence of blood and mucus and contained oöcysts but remained fairly firm. On February 7 was killed; lesions were not so marked as in the preceding calf, no doubt due to the smallness of the infecting dose, but were confined to the small intestine, the chief lesions being in the upper part of the ileum.

Rabbits 1 and 2.—In view of the statements of some authors that *Eimeria stiedae* of the rabbit and *E. zurni* of cattle (which at that time it was presumed was the coccidium involved) were identical, on March 8, 1918, two rabbits were given a drench of 2 c.c. of a highly concentrated culture of oöcysts. In this dose sporozoite formation was well advanced, but the animals suffered no ill effects whatever. It may be mentioned that Guillebeau, Zublin, and recently Galli-Valerio failed to infect the rabbit with *E. zurni*. Conversely, a cow and a calf were allowed to eat hay that had been used as bedding for coccidia-infested rabbits, with negative results.

Cockerels 1-4.—Were fed cattle coccidia with negative results.

THE PARASITE

The Oöcyst and Its Development

The shape varies; spherical, elliptical and ovoid forms are seen, and upon rare occasions ovoid cysts may show a slight flattening at the smaller end or may be slightly concave. In adult animals about 45 per cent are spherical, but in very young calves spherical forms are rare. The larger oöcysts are always ovoid or elliptical. The smaller cysts apparently show a tendency to become spherical in course of time, e. g., in some feces two years old it was difficult to find any but spherical oöcysts.

All cysts are circular on cross section. The wall is double contoured and varies in tint from colorless to a light muddy brown. In ovoid oöcysts the wall tends to diminish slightly in thickness toward the narrow pole. No evidence of a micropyle was seen.

Early in the disease the oöcysts appear to be larger, and in very young calves they are usually elliptical in shape.

About 250 oöcysts were measured. They varied in size from 11.6 to 43.1 microns in length and from 11.6 to 27.8 microns in width. The average size of 210 oöcysts was 17.4 by 15 microns for animals over four months of age, cysts exceeding 20.7 by 17.6 microns being very scarce. In calves about 6 weeks of age it is not uncommon to find oöcysts 33 by 24 microns.

The forms usually seen in fresh feces are those in which the cytoplasm either completely fills the cyst, is beginning to contract, or has contracted into a circular mass (figs. 1-4). The early form is made up of finer granules than those that show contraction of the cytoplasm. The granules are highly refractile. Occasionally ameboid movement of the granules is seen, and in one instance such movement (which was very active) was watched for 20 minutes without the cell coming to rest. (It is interesting to note that a similar condition was kept under observation in a coccidium of the rabbit for 20 hours. The nucleus is sometimes visible.

The commonest fecal form is that in which the protoplasm has contracted into a circular mass, usually at the middle or toward the broader end of the cyst. It is composed of coarse, highly refractile granules. The nucleus is sometimes visible.

The next stage is that in which the granules separate and collect into four bunches forming the sporoblasts (figs. 5, 6). There is no *Restkörper* left behind in sporoblast formation. The sporoblast secretes a homogeneous membrane, the sporocyst, in which it becomes enveloped (fig. 7). This membrane may show acute angles. The sporocysts become ellipsoidal (fig. 9), and are circular on cross section. At first containing refractile granules, they become homogeneous and appear to have a number of vacuoles in them (fig. 10). The sporocyst becomes pointed at one end and a large vacuole or body appears in the broad end; the protoplasm contains well-marked granules (fig. 11). The vacuolated body moves toward the center and divides; each half then moves toward the opposite pole (fig. 12). The sporocyst now commences to divide longitudinally to form the sporozoites (fig. 13); the single contoured membrane of the spore is thickened into a minute cap at the smaller pole

(Stieda's plate). There are two sporozoites in the spore and a *Restkorper* composed of refractile granules. The *Restkorper* usually lies between the sporozoites but may be scattered; it is relatively larger in the smaller oöcysts. The line separating the sporozoites tends to run diagonally across the spore, this being more marked in the smaller cysts. The sporozoites are broad at one end and taper toward the other; the nucleus lies in or near the broad end; they lie with their broad ends at opposite poles of the spore, and with their *Restkorper* completely fill the spore. In one instance they were seen to be no longer lying *tête-bêche* but had twisted until both lay with their narrow ends pointing toward the smaller pole (fig. 15); in this position they did not completely fill the spore, a large vacuole appearing in the broad end.

Several sporocysts were measured in the oöcyst. They varied in length from 6.6 to 19.9 microns and in breadth from 4.5 to 8.3 microns.

Development.—That the sporozoites may mature rapidly under favorable conditions is evidenced by the infection of an animal dosed with feces that had been passed three days (experimental heifer 2).

Upon one occasion an oöcyst was found that contained fully developed spores in feces that certainly were not more than 24 hours old, and which were probably passed less than 12 hours. Sporoblast formation may be seen in feces 24 hours old but is rare.

The most favorable conditions (temperature, moisture, oxygen) governing the maturation of the sporozoites have not been determined. When kept in the laboratory and supplied with moisture complete development has not occurred in less than eight days, and may be delayed for weeks or months if too much or too little moisture is supplied.

Some centrifuged feces kept in a centrifuge tube and supplied with a little moisture at very irregular intervals show after 13 months some oöcysts that are still infective, some that have never developed, and a large number that contain gas bubbles, indicating degeneration. Fantham has shown that the oöcysts of *Eimeria avium* may be infective after two years, and it seems highly probable that the species under consideration may be infective for that length of time when kept under natural conditions.

The Parasite in the Tissues

The sporozoites, judging from the size of the spores, undoubtedly vary a great deal in size. Only two have been seen in sections;

they measured approximately 10.7 by 2.4 microns. They differ from the very similar merozoites in the nucleus, which does not show a karyosome, is comparatively a little smaller, and is eccentrically located (fig. 16).

The trophozoite.—Uninuclear schizonts are scarce in sections. Those seen measured from 5.8 to 8.3 microns in length by 4.9 to 7.4 microns in width. They are roundish or elliptical in outline, their cytoplasm is alveolar, and the nucleus is usually eccentrically placed, is relatively large and contains a karyosome (fig. 17).

Schizont (figs. 18–23).—The nucleus of the trophozoite divides, the number of nuclei produced varying greatly in number; forms containing as few as six have been seen, up to those in which the number could not be counted. At first the nuclei are minute spots; soon a light is seen around them which gradually grows until it elongates to form the body of the future merozoite; at the same time the nucleus increases slightly in size and when the merozoites are well advanced shows a well marked karyosome. Schizonts have been seen measuring from 8.3 by 8.3 to 61.4 by 49.8 microns.

Upon one occasion, in experimental calf 3, a minute yellowish spot in the small intestine was placed under a cover slip and examined, slight pressure having been exerted on the cover slip; this proved to be a schizont containing merozoites that were evidently fully developed, as evidenced by a slow but distinct movement of their posterior end, and which were arranged into approximately thirty bunches, each bunch being composed of merozoites which radiated in all directions from a common center, with their posterior (furthest from nucleus) end toward the outside. Under the conditions mentioned this mass measured approximately 282 by 207 microns. One or two other spots of apparently similar nature were seen in this intestine, and efforts were made to secure sections, but unfortunately, owing to the lack of a microtome of the rotary type, they were lost. Such schizonts have been repeatedly looked for since but have never been seen.

While in the unique schizont mentioned above the merozoites were arranged in a stellate form, in the schizont usually found they do not seem to follow any definite form, but rather might be likened to a lot of fish thrown into a basket (see fig. 22). The schizont may be circular in outline or elliptical and is sometimes comparatively irregular. There is no cell membrane; this statement, in fact, applies to all forms of the parasite outside of later stages of the macrogametocyte and the oöcyst with its spores.

The merozoites are about 10 microns long by 2.9 microns wide, but are subject to slight variation. Their cytoplasm is finely granular, and their nucleus contains a well-marked karyosome and is located well toward the broader end (fig. 24).

Microgametocyte.—Uninuclear microgametocytes appear to be very scarce in sections. They are elliptical in shape; their cytoplasm is not alveolar and is distinctly smoother in appearance than that of uninuclear schizonts; the nucleus is eccentrically located and consists of a karyosome surrounded by a halo which may not be very distinct. They measure about 3.3 by 4.9 microns (fig. 25). The nucleus then breaks up into minute granules and forms a fine chromidial network (figs. 26, 27) which may be more or less vacuolated; minute spots will next be seen which show a tendency to collect into bunches (fig. 28). In this, however, there is considerable variation, some showing the spots evenly distributed and others at the periphery. The next stage shows minute loops with a central hollow (fig. 29); the loop gradually becomes more open (figs. 30, 31) and shows a slight thickening toward one end. At a later stage the loop has disappeared, the microgametes being bow shaped and showing a slight thickening toward their middle; they stain intensely with basic dyes (figs. 32, 33, 34). They may be arranged in the cell in three different ways—around the periphery in a well-marked band, completely filling the cell, or in a reticular manner without any definite arrangement. When fully developed the microgametocyte shows an enormous variation in size; they may be 8.3 by 11.6 microns, or may be so large as almost to fill the field of an immersion lens. The largest one measured was 116.2 by 132.8 microns. As with the schizonts, the largest forms were found in the youngest animals.

The microgamete (fig. 35) measures approximately 0.55 by 2.75 microns. While it undoubtedly possesses flagellæ, these could not be seen.

The macrogametocyte.—The young form may be distinguished from uninuclear schizonts or microgametocytes by its rounder shape; its relatively large nucleus is eccentrically located and contains a karyosome. The smallest seen measured 3.3 by 3.3 microns (fig. 36). At an early stage metachromatic granules are seen, and the chromosomes have unravelled from the nuclear network (fig. 37). This has been noticed in a cell measuring 8.3 by 6.6 microns. The macrogametocyte continues to grow and become loaded with chromatoid and plastinoid granules (fig. 38). If the nucleus can be

seen at this time it will be noticed that it has lost its rounded shape and that it contains a number of chromidial threads (fig. 39).

The lighter staining plastinoid granules move to the periphery, and the chromatoid form a more or less irregular circle around the nucleus (fig. 40). Owing to the deep-staining chromatoid granules the nuclear changes are often obscured; this, together with the smallness of the parasite and the optical equipment available, does not allow the karyokinetic figures to be described in detail.

The nucleus then shows as a chromidial network surrounding the karyosome (fig. 42). Fertilization then takes place, but unfortunately was not observed; however, one cell was found in which the microgamete had gained access to the female pronucleus (fig. 43). The nucleus now undergoes several changes (figs. 44, 45, 46, 47), and then becomes temporarily resolved into chromidia (figs. 48, 49), from which is formed by concentration of the scattered granules (figs. 50, 51, 52) another complete nucleus (fig. 53).

Shortly after fertilization the cell begins to show a thin membrane, apparently formed from the plastinoid granules. The wall appears to form slowly. According to Fantham, in *Eimeria avium* the inner wall of the chitinoid membrane is formed by the chromatoid granules. In the species under consideration I am not at all sure that this is the case. In figure 53 a cyst can be seen with well-developed walls, yet the chromatoid granules are still visible within the cyst. At a later stage, as, for instance, in figure 54, they are no longer in evidence but have apparently broken up to form the fine granules seen in early oöcysts.

The zygote nucleus has only been noticed to be dividing three times in sections, as by this time the cysts are usually in the lumen of the intestine.

Occasionally degenerated oöcysts are seen in sections; they occur as empty shells or show crumpled walls and represent parasites that can not be discharged outward. They occur in intertubular tissue.

CONCLUSIONS

The endogenous cycle of *Eimeria zurni* does not appear to have been worked out; any comparisons therefore must be based largely on the oöcysts.

Gray, quoting Montgomery on the oöcysts of *E. zurni*, mentions a micropyle. Galli-Valerio says: "In some forms there is a micropyle, the protoplasm filling all the cavity. These forms represent recently fertilized macrogametes." This does not correspond with

our species, no micropyle being present, the macrogamete being fertilized before its wall is in evidence.

Judging from Smith and Graybill's article, Zublin describes *E. zurni* similarly to a species seen by them, i. e.: "There is no *Restkorper* left behind in the formation of the sporoblasts. There is no *Restkorper* in the spore."

In the British Columbia species, a residum occurs in the spore. According to Montgomery in Gray's article, the merozoites are arranged in the epithelial cells like the quarters of an orange. While there is at times a suggestion of this in our species, as a general rule their arrangement in the cell is irregular.

Galli-Valerio mentions that Guillebeau gave coccidia to three young calves to eat, and noticed fever and diarrhea in them after three weeks. With us the incubation period is only two weeks, the fever is either absent or only slight.

The foregoing covers the main differences noted between the British Columbia species and *E. zurni*. Owing to the fact that the endogenous cycle of the latter has not been ascertained, points of comparison are necessarily limited.

Smith and Graybill have recently described a coccidium found by them in young calves in New Jersey. They found two varieties of oöcysts, one small and corresponding to *E. zurni*, the other larger and corresponding to ours, except that ours shows a much greater variation in size. It is possible that they were dealing with two species, but they were unable to distinguish any differences in the endogenous cycle.

Many differences can be seen between our species and that described by them. Our merozoites are not banana shaped bodies, but taper slowly toward one end and acutely to the other, and their nucleus is not central but is distinctly toward one pole. While our schizonts may be as small as Smith and Graybill's, we also get forms five times as large. This also applies to the microgametocytes, but in this instance they may be more than ten times as large, and show a much greater variation in contour and in the arrangement of the future microgametes.

Evidence of active multiplication of coccidia in cattle older than three months was not noted by Smith and Graybill, and in such calves the seat of the disease was the large intestine. In British Columbia animals of all ages are affected, and while the large intestine suffers most in adult animals, in calves of three months or so the small intestine is most heavily involved.

It is believed that a coccidium different from any previously described has been found in British Columbia cattle, which it is proposed to call *Eimeria canadensis*.

SUMMARY

A dysentery due to coccidia has been seen affecting range cattle of all ages in British Columbia. It occurs in the dry interior of the province and usually in the winter.

Out of 165 *visibly* affected animals 50 died (30 per cent). Young animals suffer the most severely. Fatal cases die usually in from two to five days after showing symptoms, and within 24 hours of death are subject to fits of not more than a minute's duration, death being in convulsions. The principal lesions are confined to the rectum of older animals and to the small intestine of young calves.

The following treatment was found effective in controlling the disease: Fifty pounds of a mixture consisting of sulphur 2 parts, sulphate of iron 2 parts, salt 6 parts, was mixed with 100 pounds of linseed oil-cake meal, and was fed in troughs to 100 head per day for two weeks.

The coccidium responsible shows several differences from available accounts of *Eimeria zurni*, and also differs from the coccidia of New Jersey calves reported by Smith and Graybill of the Rockefeller Institute. The name *Eimeria canadensis* is proposed.

Symptoms develop in fourteen days after the ingestion of infective oöcysts. It is apparently only pathogenic for cattle. Oöcysts may be infective within three days of being passed, and have been infective after thirteen months when kept under adverse conditions in the laboratory.

Infected ground should be treated with some form of lime and then deeply ploughed.

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ADDENDUM

A 6-months calf was recently (August 17) found to be affected

at Agassiz, B. C. Whether the coccidium responsible is the same as that found in the dry interior or not, it is impossible to say without further study.

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EXPLANATION OF PLATES

All drawings were made by Mr. C. W. Young under the direction of the author. They have been drawn free-hand and on the same scale throughout, one-sixteenth of an inch being approximately equal to 1.66 microns. A Bausch & Lomb 1/12 lens with a 5X ocular was used, giving a magnification of 475 diameters. The drawings are uniformly slightly larger than when seen under the microscope, on account of the difficulty of reproduction at the magnification mentioned. Unless otherwise stated, Mallory's methylene blue and eosin stain was used. Measurements given refer to the parasite drawn, and are not necessarily average measurements.

PLATE 1

Exogenous forms (oöcysts), not stained

- Figs. 1 and 2.—No. 2 is the commonest early form, the oöcyst with a concavity being comparatively scarce. At this stage the cyst is filled with very fine granules. The nucleus is sometimes visible. Size 16.6 by 13.2 microns.
- Fig. 3.—The cytoplasm is beginning to contract and the granules are coarser. Size 16.6 by 13.2 microns.
- Fig. 4.—A common form seen in feces, the cytoplasm being contracted into a circular mass. The nucleus is sometimes visible. Size 17.4 by 17.4 microns.
- Fig. 5.—Granules breaking up into bunches prior to sporoblast formation. Size 17.4 by 17.4 microns.
- Fig. 6.—Sporoblast formation. Size 17.4 by 17.4 microns.
- Fig. 7.—Sporocysts forming. In many instances they show quite acute angles. Size 16.6 by 16.6 microns.
- Figs. 8 and 9.—Sporocysts. Size 18.2 by 16.6 and 16.6 by 16.6 microns.
- Fig. 10.—Vacuoles appearing in a homogeneous cyst. Size 28.2 by 19.9 microns.
- Fig. 11.—Cyst showing a large vacuolated body in the sporocyst. Size 31.5 by 26.5 microns.
- Fig. 12.—The large vacuole has divided into two, each of which move to opposite poles. Size 30.7 by 24.9 microns.
- Fig. 13.—Oöcyst nearing maturity. The sporocysts show a slight thickening at one end, and a longitudinal division. The sporozoite nucleus is visible. Size 33.2 by 24.9 microns.
- Fig. 14.—One of the smaller oöcysts (16.6 by 16.6 microns) at a somewhat earlier stage than the preceding figure. The sporocyst residuum is more marked than is often the case, and the sporocysts have not assumed their final shape, i. e., pointed toward one end.
- Fig. 15.—Mature cyst (32.3 by 24.9 microns). Sporocysts show a residuum of round, highly refractile granules, a thickened cap or Stieda's plate at the narrow pole, and contain two sporozoites. In one spore it will be noticed that the sporozoites have twisted until they are both pointing in the same direction, and that a vacuole is left in the broad end of the spore.

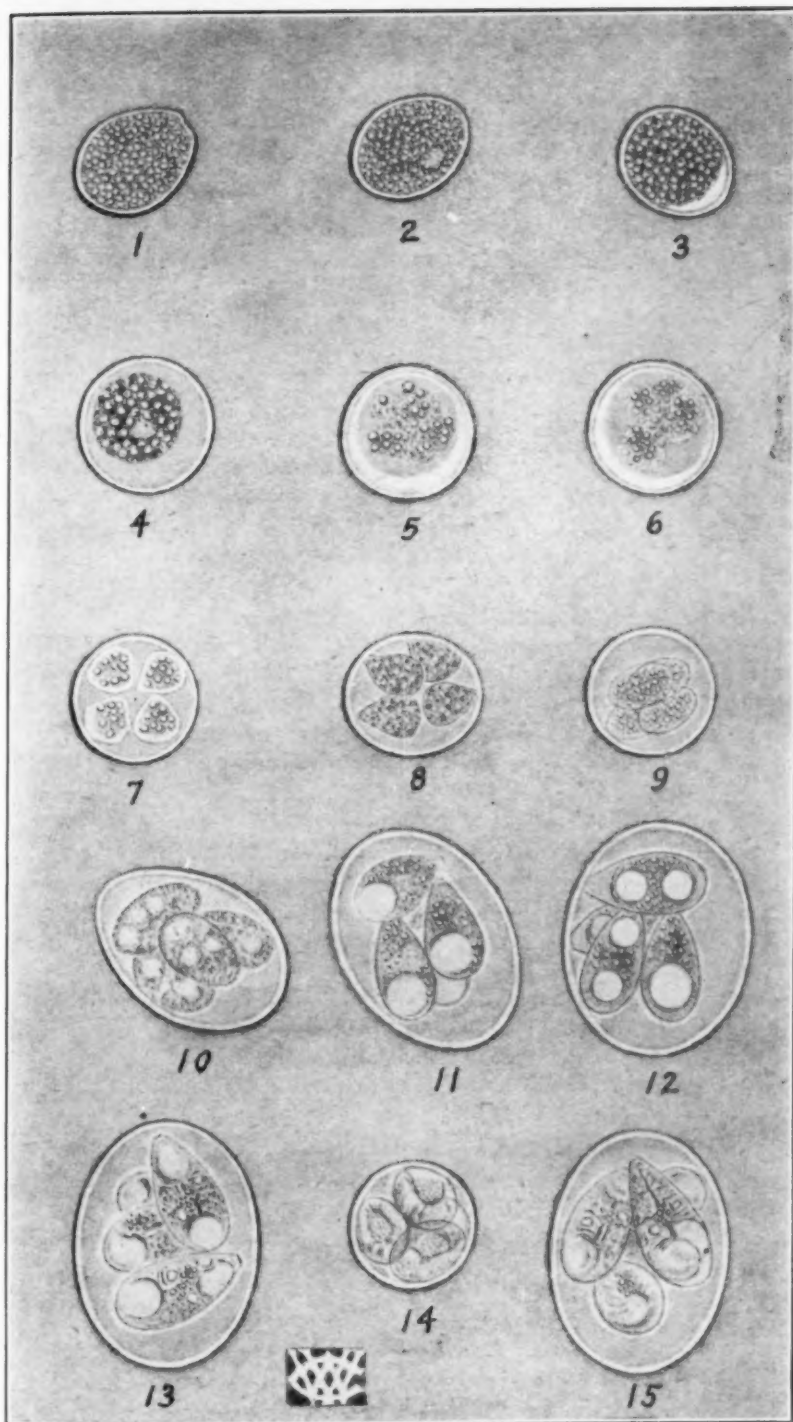


Plate 1.—Exogenous Forms (Oocysts) of *Eimeria Canadensis*

PLATE 2

Endogenous forms, from ileum unless otherwise stated.

- Fig. 16.—Sporozoite from rectum. Size 10.7 by 2.4 microns. Iron-hematoxylin.
- Fig. 17.—Tropozoite (5.9 by 3.3 microns), showing a vesicular cytoplasm and a relatively large nucleus with a karyosome.
- Fig. 18.—Young schizont (10.7 by 10.7 microns). The nucleus is dividing and the cytoplasm is more irregular.
- Fig. 19.—Schizont (36.5 by 34.86 microns), showing numerous nuclei which are beginning to show a light space around them.
- Fig. 20.—Schizont (9.9 by 9.9 microns) a little further advanced than No. 19.
- Fig. 21.—Schizont (26.5 by 26.5 microns), a somewhat uncommon form. The light space around the nuclei will elongate to form the body of the future merozoite.
- Fig. 22.—Schizont (43.1 by 24.9 microns) in which the merozoites are forming. Notice the way in which they lie.
- Fig. 23.—Schizont from rectum (14.9 by 13.2 microns). Merozoites further advanced; their nucleus shows a light space (karyosome), which has been drawn a little too large. Phosphotungstic acid hematoxylin.
- Fig. 24.—Merozoites from rectum, about 10 by 2.9 microns. The nucleus is located toward one end, and contains a well-marked karyosome. Their cytoplasm is very finely granular. Giemsa.
- Fig. 25.—Uninuclear microgametocyte (4.9 by 3.3 microns). Rare in sections. Cytoplasm smooth in appearance compared with the trophozoite. The halo around the nucleus may not be well defined.
- Fig. 26.—Microgametocyte (9.9 by 6.6 microns). The nucleus is breaking up, and the cytoplasm has lost its smooth appearance.
- Fig. 27.—Microgametocyte (26.5 by 24.9 microns). Shows a very fine spotting. The finely reticular cytoplasm is somewhat vacuolated.
- Fig. 28.—Microgametocyte (33.2 by 33.2 microns). Spots more marked, also vacuolated spaces. The latter vary in number and position. Instead of six as shown in the figure there may be thirty or more.
- Fig. 29.—Microgametocyte (12.4 by 5.8 microns) from rectum. Spots relatively large, as the gametes are curved on themselves.
- Fig. 30.—Microgametocyte (11.6 by 8.3 microns) from rectum. Giemsa.
- Fig. 31.—Similar to the preceding, size 33.2 by 33.2 microns. Gametes in the form of loops or half curved.
- Fig. 32.—Microgametocyte (41.5 by 41.5 microns) with gametes arranged in a band around the periphery.
- Fig. 33.—Similar stage to the preceding, but is completely filled with gametes. Size 33.2 by 26.5 microns.

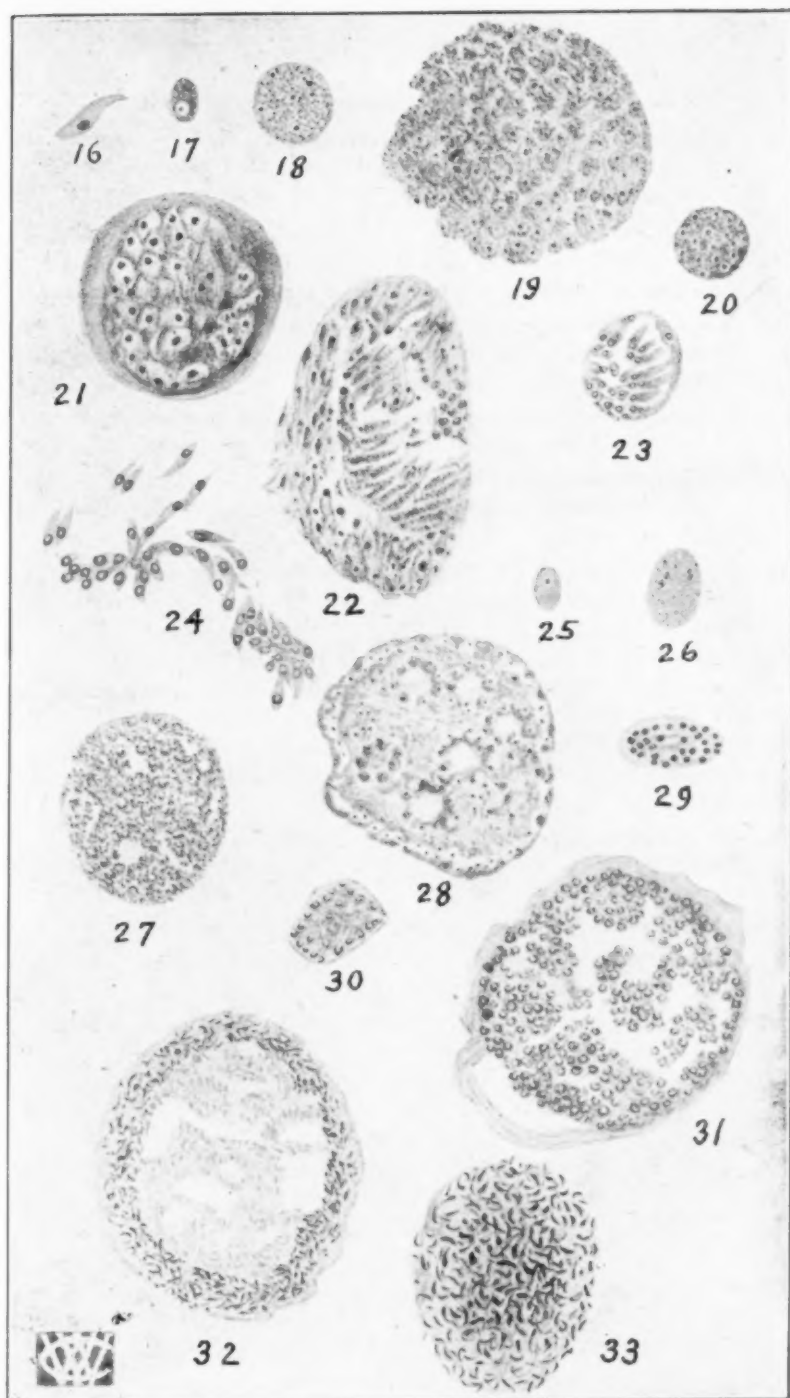


Plate 2.—Endogenous Forms of *Eimeria Canadensis*

PLATE 3

Endogenous forms, from ileum unless otherwise stated

- Fig. 34.—Similar stage to the two preceding figures, but the gametes are arranged in a reticular manner. Such cells may assume any shape, but are usually irregular circles. Size of upper part 39.8 by 33.2 microns, of lower part 66.4 by 36.5 microns.
- Fig. 35.—Microgametes, about 2.75 by 0.55 microns.
- Fig. 36.—Young macrogametocyte (3.3 by 3.3 microns), usually round.
- Fig. 37.—Young macrogametocyte (9.6 by 9.6 microns) showing meta-chromatic granules, and in which the chromosomes have unravelled themselves from the nuclear network.
- Fig. 38.—Macrogametocyte with granules of reserve food material. Size 12.4 by 9.9 microns. Iron hematoxylin and Van Gieson.
- Fig. 39.—Macrogametocyte (13.2 by 13.3 microns) in which the nucleus is losing its rounded shape and in which a number of fine chromidial threads are visible.
- Fig. 40.—Macrogametocyte (19 by 14.9 microns) in which the lighter staining plastinoid granules are going to the periphery. Iron hematoxylin and Van Gieson.
- Fig. 41.—A deeply stained macrogametocyte (18.2 by 16.6 microns) at approximately the same stage as the preceding figure. Iron hematoxylin and Van Gieson.
- Fig. 42.—Macrogametocyte (24.9 by 19.9 microns) in which the karyosome is surrounded by fine chromidial threads, presumably prior to fertilization.
- Fig. 43.—A microgamete has gained access to the pronucleus of the macrogamete. Iron hematoxylin and Van Gieson. Size 18.6 by 14.9 microns.
- Fig. 44.—Fertilized macrogametocyte (21.5 by 16.6 microns).
- Fig. 45.—Fertilized macrogametocyte (18.2 by 13.9 microns) in which the chromosomes are arranged in the form of a spindle.
- Fig. 46.—Shows another arrangement of the chromosomes. Iron hematoxylin and Van Gieson. Size 21.5 by 16.6 microns.
- Fig. 47.—A not uncommon form of the macrogamete. At this stage the cyst wall is beginning to show quite plainly. Size 21.5 by 18.2 microns.
- Fig. 48.—Macrogamete in which the chromosomes are distributed along the length of the cell. Size 19.9 by 13.2 microns.
- Fig. 49.—Macrogamete in which the chromosomes are beginning to come together (23.4 by 19.9 microns).
- Fig. 50.—Macrogamete in which the chromosomes are in a compact bunch. The plastinoid granules have almost disappeared and the cyst wall is well marked. Size 24.5 by 21.5 microns.
- Fig. 51.—The chromosomes are in a more or less irregular circle. Size 18.2 by 16.6 microns.

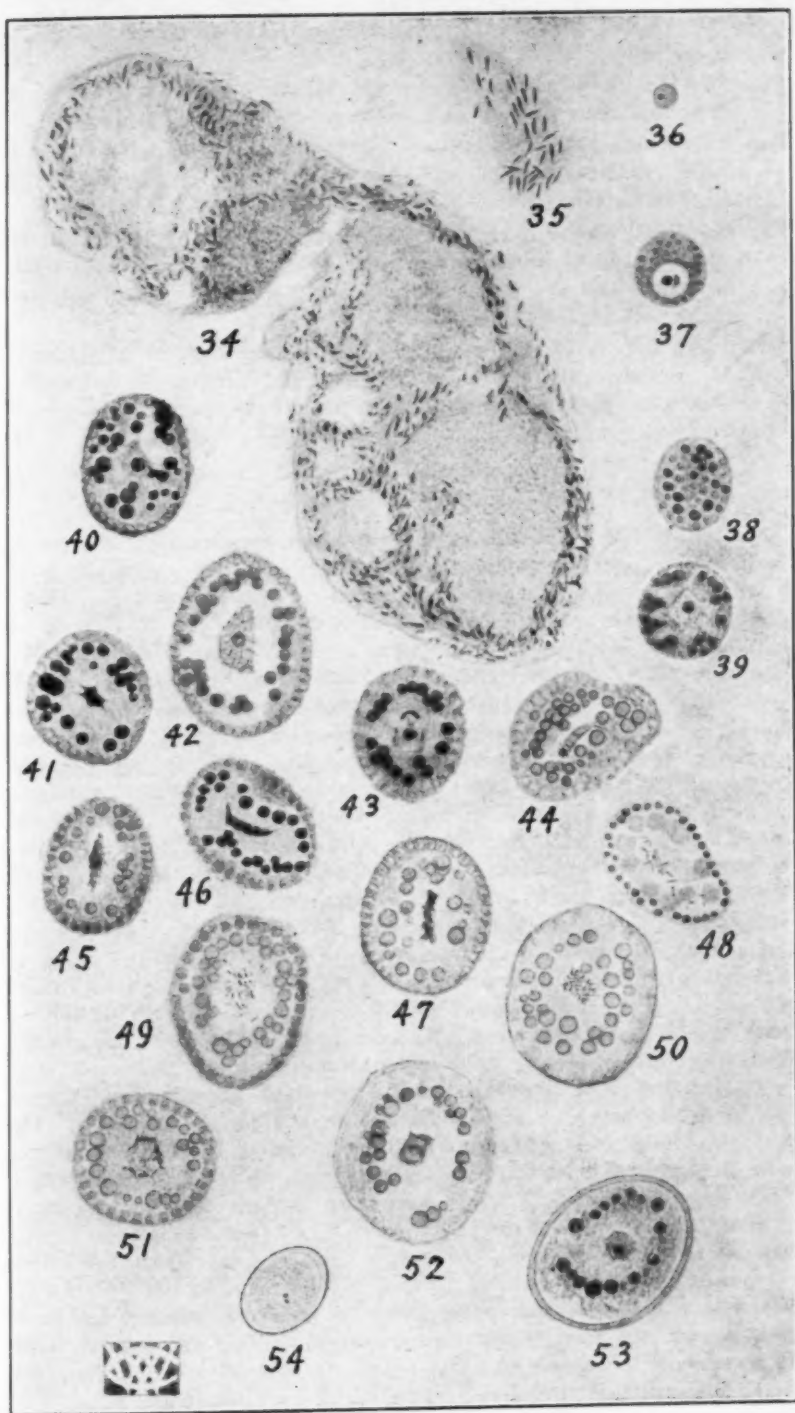


Plate 3.—Endogenous Forms of *Eimeria Canadensis*

Fig. 52.—Macrogamete that shows the zygote nucleus in process of formation. Size 24.9 by 21.5 microns.

Fig. 53.—Oöcyst showing its double wall; the chromatoid granules are still in evidence; the nucleus shows a karyosome. Iron hematoxylin and Van Gieson. Size 24.9 by 19.9 microns.

Fig. 54.—Small oöcyst from rectum (14.9 by 9.9 microns) in which the zygote nucleus is beginning to divide to form the sporoblasts. The chromatoid granules have disappeared and the cyst is filled with fine granules. Giemsa.

NOTE.—It is possible that some of the figures showing the karyokinetic changes are misplaced, if so, the author would be glad to receive information as to their correct position.

DISCUSSION

CHAIRMAN DAY: Dr. Hagan has agreed to enter into the discussion of this very important paper.

DR. HAGAN: I am sorry to say I wrote to Dr. Hoskins that I would discuss the paper and then forgot about it until now. In New York we have not made much study of coccidiosis. There are two sizes of coccidia. Ours are nearly spherical and of the smaller type. In connection with the disease there is not much known about the condition. Some practitioners have seen this condition for a number of years. I know one case of an aged cow in which lesions appeared as Dr. Bruce has explained in his paper. There were some in the large intestines, but they seemed to be mostly in the small intestines. Some say they are found in the large intestines only. From the viewpoint of diagnosis it is important to remember that the lesions are not confined to the large intestines.

DR. BIRCH: I think I understood Dr. Bruce to say he found the temperature low. I think I have always found it high.

DR. BRUCE: I think, Doctor, you have in mind Dr. Schultz's paper. I have taken a number of temperature records. We follow a rule in British Columbia. Dr. Schultz, however, describes temperatures up to 107. I have never seen the temperature higher than 103.7. I believe many of the high temperatures are due to the second infection of the disease.

A MEMBER: The first case we had we didn't know what it was at the time. In that case the animal did carry a high temperature. The pure coccidiosis does not carry a high temperature. The temperature was not raised at all or if so, very slightly.

DR. CONNAWAY: I suspect we have more of the trouble than we think. I make the suggestion to the practitioners here to send samples to a State laboratory for examination. I recall a case of dysentery that occurred in our dairy. I happened to have a test tube and ran it up into the few words is the chance for the students in animal industry. I know the rectum and found forms as represented in the lantern slides here. I feel confident that we had that disease to contend with. We stopped it by a mixture of turpentine, camphor and oil. But in the larger field the treatment recommended by Dr. Bruce would be more adequate.

THE TREATMENT OF JOINT-ILL IN FOALS WITH THE DAM'S BLOOD

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THE etiology of joint-ill in foals has been, as is well known, much discussed during the last twenty years. From the investigations of several bacteriologists we now know pretty clearly the different kinds of bacteria found in cases of joint-ill. But the question as to how foals are infected has not yet been satisfactorily answered. From their investigations of the carcasses of foals bacteriologists have concluded that infection takes place through the navel and that these cases should be regarded as common wound infections with pyo-septicemia as a result. On this point the reader should consult the articles written by Ostertag, Våth, M'Fadyean and Edwards, Adersen, Magnusson and others. On the other hand, stud veterinary surgeons especially, such as Sohnle, Bernhardt, Mieckley, Mann and others, and also bacteriologists such as Schofield and others, have shown that the foal is already infected within the uterus. It has been observed that not only the foals of a certain dam die year after year, but even the foals of other dams in the same stud contract the disease. Cases have also been met with where the same morbid agent was found in the womb of the dam as that found in the joints of a foal which had died of joint-ill (Sohnle). It has also been proved that joint-ill stands in intimate relation to infectious abortion in mares (Schofield and others).

For my part, I am of the opinion that the dam is the most common carrier of the joint-ill virus, and that she is frequently affected with an endometritis and infects the foal already in the uterus or at birth. It is also possible that the mare carries the virus in her intestines, as was pointed out by Magnusson, and infects the foal after birth either through the mouth or through the navel. Even the milk of the dam has been suspected of being the cause of infecting the foal. But on the other hand it can not be denied that cases of common wound infection through the navel occur.

When a mare does not suffer from the infection she is supposed to carry antibodies against it. Sohnle was the first to point this out. On this question he writes (*Zeitschrift für Gestütskunde*, 1910, part 11) that the new-born also inherits such antibodies and this ex-

plains why the foal does not contract the disease before a lapse of ten days or more. He writes also that he believes that the serum of the dam could be used as a prophylactic on the foal, while it would add to the opsonian power of the foal's blood. However, he has never tried this method and no one has tested his theory. But Sohnle, in treating cases of joint-ill, has only used serum from a serum horse treated with cultures from foals which had died of joint-ill.

I have gone further than Sohnle and in *Svensk Veterinärtidskrift*, 1915, part 5, recommended the use of the serum from the dam for the treatment of joint-ill. In the following year, 1916, I published an article in the *Berliner Tierärztliche Wochenschrift*, part 12. Since then articles have been published with reference to the very good results of this method of treatment, as will be seen below, and many practitioners have also informed me of many cases in which they used this method with excellent results.

But in order to be able to use the serum from the dam there must be at least one day's delay, and therefore I have recommended the method of injecting the blood of the dam direct. For this purpose the method of R. Lewisohn (*Münchener Medizinische Wochenschrift*, 1915) is the most simple. Lewisohn adds neutral sodium citrate to the blood in the proportion of 2 per 1,000. By this means coagulation of the blood of man and dogs is prevented for a period of 24 hours, but, from my own observations, there is no coagulation at all in the blood of horses. Thus, prepared blood can be injected intravenously without any danger, and it is also easily resorbed after subcutaneous application. This method was used by Lewisohn for the purpose of blood transfusion after numerous bleedings or in cases of anemia as a consequence of septicemia.

The technic in using this method of treating joint-ill is the following:

Instruments, such as bleeding needles, knife, syringe, and bottle or vessel for catching the blood, should be boiled, but care should be taken that the water used for this purpose does not contain a high percentage of lime, as the blood will then coagulate in spite of the addition of sodium citrate. In such cases distilled water should be used, or else the water should be boiled once before being used for the instruments, or more citrate should be added to the blood. Solution of sodium citrate, 1 to 50, is poured into the bottle or vessel which is to be used for catching the blood, and then shaken so that

the walls of the vessel are moistened. Care should be taken that the blood does not foam, because foaming blood coagulates easily. During the bleeding the blood must be shaken or stirred gently so as to mix it with the citrate. One gram of sodium citrate is sufficient for 500 c.c. of blood, and this much, or a little less, is the quantity generally used as a dose.

Blood treated in this manner can be injected either subcutaneously or intravenously. When injecting subcutaneously the quantity of blood is divided so that 50 or 100 c.c. is injected at each place. The best places for injection are the sides of the neck and of the chest. For subcutaneous injection it is not necessary to mix the blood with the citrate; as a matter of fact it is even possible to inject the blood direct. A needle is put into the dam's vein and another needle subcutaneously into the foal. By means of a large syringe, warmed by hot water, 50 or 100 c.c. of blood is taken out of the dam's vein and rapidly injected into the foal. Then the needle in the foal is inserted at another point and a new quantity injected. This method of injecting without the addition of citrate was first used by Meyer for this purpose; otherwise it has been used in auto-transfusing blood.

When injecting intravenously it is advisable to add the citrate, and to add it as described here, otherwise thrombosis is to be feared. The blood should be kept at body temperature, which can easily be done by placing the bottle or vessel containing the blood into a vessel at this or a little higher temperature. The injection can be made either with a syringe or through a funnel, but in every case it must be made *slowly* and without any great pressure, otherwise there is a danger of the foal getting an acute dilatation of the heart.

It is natural that the earlier the foal is treated the better the result to be expected. In a case of intravenous injection one may, of course, expect that the foal will recover earlier than if the injection had been made subcutaneously; but it still remains to be investigated whether it is not advisable to inject simultaneously 200 or 300 c.c. intravenously and the same quantity subcutaneously. The subcutaneously injected blood is less rapidly resorbed and is thus effective for a longer period of time.

Some cases have been reported where an anaphylaxis resulted from the injection. This can be prevented by pinching the India-rubber tube for a few minutes after injecting 20 or 25 c.c. of the blood or serum, after which the remainder is injected. Thus Lieblisch, among others, has prevented an anaphylaxis.

From the results of this treatment with the blood or serum from the dam the following cases may be mentioned:

1. Purebred foal, four days old; joint-ill with swollen left elbow joint and lameness. Temperature 40° C. (104° F.). On the third day of its illness the foal was given subcutaneously 140 c.c. of serum from the dam. In two days the fever disappeared, the foal recovered and became quite well. In the preceding year a foal of the same mare had died of joint-ill. The foal was treated by Battalion Veterinarian Breide, Helsingborg, Sweden.

2. Foal eight days old. Had been ill for two days, having some fever and swollen joints. It was given 300 c.c. of the dam's serum subcutaneously. In two days it recovered and after that was quite sound.

3. A seven-days-old purebred foal. Symptoms like case 2, but having also a navel abscess. On the third day 300 c.c. of serum from the dam was injected subcutaneously. The abscess was opened and after two days the foal was apparently sound, the swelling of the joints disappearing gradually.

4. Foal a week old; lying down, unable to get up; knee and hock joints swollen. Apparently there was no hope of recovery, but nevertheless it was injected with 350 c.c. of the dam's blood subcutaneously. The next day a pronounced improvement was noticed so that the foal was able to get up, and after fourteen days the swelling of the joints had disappeared.

5. Foal (age not communicated) had been ill for five days with great general systemic disturbances and purulent, affected joints. It was treated subcutaneously with 1,000 c.c. of the dam's blood, but died on the tenth day. Postmortem examination showed general pyemia.

Cases 2 to 5 were treated by District Veterinarian J. Andersson, Marifred, Sweden.

6. Halfbred foal, three days old, was ill with a temperature of 39° C. (102.2° F.) and having swollen joints. On the third day of its illness it was treated with 300 c.c. of the dam's serum intravenously. The following day there was a good improvement, and on the next day the foal had no fever and after a week's time the swelling of the joints disappeared.

This case was treated by Veterinarian O. Sten, Malmö, Sweden.

7. Foal, ten days old, was ill with swollen left stifle joint. On the fifth day of the illness it was injected with 400 c.c. of the dam's serum and the joint was treated with iodine solution. Following this there was an obvious improvement, but about sixteen days later the left shoulder joint was swollen. Four days later it was treated anew with 400 c.c. of serum, but without any result. The foal was killed eleven days after the last injection.

8. An eight-days-old foal with lameness and swollen left hock joint. There was an improvement without any treatment, but in fourteen days the foal had a relapse, the disease having affected

more joints. A treatment with 400 c.c. of the dam's blood had no result.

9. Foal, three days old, showed constipation. There was an evident improvement, but after four days both stifle joints were swollen. Two days later the foal was treated with 400 c.c. of serum from the dam, but without any result.

Cases 7 to 9 were treated by Veterinarian Vedel, Eslöv, Sweden.

10. Eighteen-hours-old foal; had been uneasy soon after birth; could not get up without assistance, and had no appetite. Temperature 39.8°C . (103.6°F .). Great depression, sunken eyes, low head. The navel was apparently sound. The foal was not lame but could not move. It was treated with 300 c.c. of blood from the mare intravenously and the same quantity subcutaneously. On the following day there was an improvement; after four days the foal could get up, and it ultimately recovered.

11. A three-weeks-old foal had been lame in the left hind leg for five days. The hock joint was swollen. The owner thought that the dam had trodden on the foal, but when the lameness and the swelling kept increasing the veterinary surgeon was called. At this time the right hock joint and the left knee were swollen and also the navel. The temperature was 39°C . (102.2°F .). The navel was treated with iodine and the foal was given 600 c.c. of the dam's blood intravenously. The lameness and the swelling now diminished gradually. In fourteen days the swelling of the knee had disappeared, but the hock joint was still swollen and sore. A further injection of 600 c.c. was given intravenously. In a month the lameness had entirely disappeared but there was still a little swelling of the hock joint.

12. Foal, belonging to the same owner as in case 11, became lame a few days after birth. The temperature was 40.1°C . (104.2°F .). The foal had no appetite and had great difficulty in getting up, the left hock joint being swollen and sore and it was very lame. It was treated with 800 c.c. of the dam's blood intravenously. Eight days later the foal had entirely recovered.

13. This foal had general disturbances at birth; suffered from depression; was incapable of getting up; and could hardly stand after being helped up. When examined twelve hours later its temperature was 40°C . (104°F .). It breathed rapidly and had no appetite. The left foreleg was lame and the knee swollen. The eyes were sunken and the head hanging. The navel was also swollen. Treatment: The navel was disinfected and 600 c.c. of the dam's blood was given intravenously. The following day the foal began sucking and on the third day it was able to get up without any assistance. The lameness disappeared, but after a month's time there was still a swelling.

14. Two-days-old foal. Had been uneasy since birth, desiring mostly to lie down. Very little appetite. Temperature 39.6°C . (103.3°F .). The vicinity of the navel, for about the size of a dinner plate, was swollen and the navel itself suppurating. There was

no lameness. Treatment: The belly was covered with Burow's solution and 200 c.c. of the dam's blood injected intravenously. The following day another injection was given, this time 300 c.c. This was done because on the first day there was a coagulation of the blood, thereby diminishing the useful quantity of serum. The water used in boiling was very rich in lime. The foal recovered completely.

15. This foal had been lame for three days. One hock joint was swollen. The swelling and the lameness increased and the foal was able to get up only with great difficulty; in fact, it had to be assisted. The temperature was 39.5° C. (103.1° F.). The treatment consisted of 500 c.c. of the dam's blood intravenously. During the next few days there was a little improvement, but some days later the foal again became uneasy. In fourteen days the veterinary surgeon was again called in, and he found that the swelling still persisted and that the foal could not stand. He gave subcutaneously and intramuscularly 200 c.c. of serum against anasarca (Jensen's). Three weeks later, according to the owner's statement, the foal had recovered.

Cases 10 to 15 were treated by Veterinarian Karlén, Sala, Sweden.

16. Three-days-old foal was ill with swollen right hock joint, general disturbances and depression. It had much difficulty in moving. In a week the region of the left knee was also swollen. The veterinary surgeon was now called. The temperature was 40° C. (104° F.). As treatment, 600 c.c. of the dam's blood was given subcutaneously. The result was a slow improvement. The foal got a better appetite, could get up without assistance, but the swelling of the joints persisted. About five weeks later when the veterinarian was again called he found that the swelling of the hock had diminished but that of the knee was still the same. He now observed a fluctuation which he did not notice the first time. There was a suppuration in the sheath of the extensor tendon. This was opened and 400 c.c. of the dam's blood was given subcutaneously. The foal gradually recovered, and when inspected at the age of 5 months was found to be quite sound, but it still had an enlargement of the hock joint. This case was reported by Veterinarian Erik Andersson, Arboga, Sweden.

17. This foal became ill when eight days old. Three days later the veterinary surgeon was called. The first symptoms were a swelling of the left hock joint and of the loin. The foal was treated with the mare's blood (quantity not mentioned). Three days later an abscess appeared at the site of each swelling. Result, death.

18. Foal, two and a half weeks old, had a large abscess on one thigh and a phlegmonous swelling about one elbow joint. The abscess was opened and blood from the dam (quantity not mentioned) was injected into the foal. Three days later an abscess appeared also on the elbow, which was opened. Result, death after two days.

19. Foal (age not mentioned) had a swelling of one hock joint. There were no general disturbances. Treated with the dam's blood (quantity not mentioned) and recovered.

Cases 17 to 19 were treated by Läns (County) Veterinarian O. Nilsson, Kristianstad, Sweden.

20. Foal three weeks old, having a temperature of 39.4° C. (102.9° F.) and unable to get up without assistance. Both hock joints were swollen and sore. The sheaths of the back tendons at the fetlocks of both the forelegs were inflamed; on the left leg the sheath had burst, discharging synovia mixed with pus. The foal was treated with 300 c.c. of the dam's blood subcutaneously. Result, recovery after three weeks.

21. Foal, fourteen days of age, having a temperature of 39.5° C. (103.1° F.), was lying down and no appetite. Both hock joints and knees were swollen. Treated by injection of 300 c.c. of the dam's blood subcutaneously. Result, recovery.

22. Foal, five weeks old, had been ill three days with lameness and swollen right hock joint. The temperature was then 40.1° C. (104.2° F.) and the foal was unable to get up, both the hock joints and the left knee being swollen and sore. Treatment, 100 c.c. of the dam's serum intravenously and 200 subcutaneously. After three days the foal could get up without assistance. A swelling which remained disappeared after being treated with "jodvasogen."

23. Foal, seven days old, had been ill for three days. Temperature 39.3° C. (102.7° F.), Hock joints swollen and foal lying down unable to get up and would not suck. Treatment, 350 c.c. of the dam's blood given subcutaneously. Result, death on the third day.

24. Foal, three weeks old. (Time of illness not mentioned.) Temperature 40.1° C. (104.2° F.). Swollen hock joints and foal lying down. Treatment, 300 c.c. of the dam's serum subcutaneously. The foal recovered.

25. A three-weeks-old foal. Had been ill three days and was lame. Temperature 39.8° C. (103.6° F.). It could not rise, the right hock joint and left knee being swollen. Treatment, 500 c.c. of the dam's blood intravenously. In a week the foal could get up without any help but was still lame and its hock joint was swollen. Then 100 c.c. anasarca serum was injected subcutaneously and a local treatment with iodine was made. In a week's time the lameness had disappeared, but the foal now had rachitis and was treated with phosphorus. Result, complete recovery.

Cases 20 to 25 were treated by District Veterinarian Ralf Bergmann, Fjärdhundra, Sweden.

26. Purebred foal, five days old, had been ill for one day with general disturbances. Had a temperature of 39.5° C. (103.1° F.) and a swollen right hock joint. On the next day, there being a little increase in the fever, the foal was treated with 300 c. c. of the dam's serum intravenously. In four days the foal recovered but the hock was still swollen. This swelling diminished by de-

grees, but did not entirely disappear until a year later. The dam had not been pregnant the two preceding years owing to endometritis. This case was treated by Veterinarian A. Forén, Norrköping, Sweden.

27. A foal, four days of age, ill, with a temperature of 38.9° C. (102° F.). It had general disturbances, sunken eyes, a difficulty in getting up, diarrhea and rapid respiration. On the following day 500 c.c. of the dam's blood was given intravenously. In some days the forelegs were swollen, but the swelling disappeared. Then the hind legs began to swell instead. There were no abscesses. The foal, now being very weak, was killed. This was the seventh time for the mare to foal; the first four foals lived, the fifth was aborted, the sixth lived, and the seventh was the one described above.

28. Five-days-old foal. Had been uneasy and the next day its breathing was rapid and temperature 39.3° C. (102.7° F.), pulse 168. Treatment, 500 c.c. of the dam's blood intravenously. Result, recovery.

29. Foal, a fortnight old, showed a lameness of the right foreleg. The elbow joint was sore. Its temperature was 39.2° C. (102.6° F.). After three days there was a general stiffness, the foal's back being now bowed. There was also a swelling of the right forearm. Treatment, 500 c.c. of the dam's blood intravenously. The stiffness increased, the swelling disappeared, but returned later. There were no abscesses. The general disturbance having increased, the foal was killed.

Cases 27 to 29 were treated by District Veterinarian J. Ekelund, Fjögsta, Sweden. Ekelund says that he regrets that he did not repeat the treatment. The non-formation of pus proves that, in the successful cases, the treatment had an influence on the disease.

30. A foal eight days of age had a swelling of the right elbow joint. At first this was treated with a local application, but as there was no improvement the foal was injected with 300 c.c. of the dam's serum subcutaneously. In a week's time the foal had entirely recovered.

31. A foal belonging to the same owner as in the preceding case. The owner neglected to call the veterinarian until the foal (age and particulars not mentioned) had many abscesses and suppurating polyarthritis. A treatment with the dam's blood subcutaneously was tried but without any good result.

Cases 30 and 31 were treated by District Veterinarian O. Hultén, Mariefred, Sweden.

32. A foal, three weeks old, was ill, having a swollen left hock joint. After two or three days the foal could not stand. There were also general disturbances and the fever was now 40.4° C. (104.7° F.) A swelling of the stifle joint of the left leg was less marked and not observed by the owner. Treatment, 300 c.c. of the dam's blood intravenously. There was some trouble with this injection owing to a partial coagulation of the blood, the water used

having a high content of lime. The swollen joints were also treated with iodine. After two days the swelling of the joints had evidently diminished and the temperature had decreased to 39.5° C. (103.1° F.), but the right hock joint had now swollen a little. In eight days all the swellings had disappeared except a little on the left hock joint, and the temperature had further decreased to 38.9° C. (102° F.). In a month the foal had entirely recovered.

This case was treated by District Veterinarian O. Carléns, Marieholm, Sweden.

Without mentioning the symptoms in detail, the following cases have also been reported:

District Veterinarian D. Bergman, Balsta, Sweden, treated 8 cases of joint-ill. In 6 cases the foals recovered, while in the other 2 the foals died. One of the latter cases was unsuccessful owing to the injected quantity of blood having been too little.

District Veterinarian W. Callmänder, Lyckeby, treated one case. The foal was injected intravenously with the dam's serum and recovered.

District Veterinarian D. Bjurström, Grästorp, Sweden, treated 3 cases, in which 2 of the foals recovered while 1 died. The latter was treated too late.

All the cases mentioned above were reported to me by letter by the veterinary surgeons who treated them. One of my colleagues, District Veterinarian Hultén, Mariefred, has also tried to treat foals preventively. In one case a dam had lost her foals three years in succession. In the fourth year the foal was inoculated with the dam's blood subcutaneously on the day after it was born and it escaped the disease.

On a large Swedish estate many cases of joint-ill had occurred during the preceding three years. In the first year 1 foal died. In the second year 5 foals were born of which 1 died. In the third year 11 foals were born, and 1 was aborted. Three became ill, one of which died, while the other 2 recovered after having been treated with antistreptococcus serum from the laboratory of the Agricultural Society at Malmö, Sweden (Chief, Dr. H. Magnusson). One of the foals is said to have been only slightly affected, the other moderately so. In the fourth year 10 foals were born, all of which were treated preventively with serum from the dams. None became affected with the disease.

In the German literature on the subject of joint-ill during the last few years many authors have written of cases where the foals were treated with the dam's serum.

Mann (*Zeitschrift für Veterinärkunde*, part 3, 1917) was chief of a camp for pregnant mares, where he had many occasions to treat

cases of joint-ill. He mentions that he was not able to obtain any good results by using the common methods of treatment and he therefore tried the dam's serum. At first the results were not good but when he began to treat the cases at an early stage of the disease he succeeded in saving a very great percentage of the foals. Out of 22 foals thus treated 19 recovered. He used a dose of 300 c.c. intravenously. He also treated 12 foals with serum from the dam as a preventive means. Two of the foals became ill but recovered very easily.

Korrenge (*Zeitschrift für Veterinärkunde*, part 9, 1917) was chief of a camp of 400 pregnant mares where he had frequent occasion to treat cases of joint-ill. He does not mention the number of cases but states that he injected the foals two days in succession with 300 c.c. of the dam's serum. In some cases he even injected, always intravenously, a third time. All the foals recovered. Korrenge is of opinion, based on the results he has obtained, that this most dangerous of all foal diseases—joint-ill—can be treated with serum from the dam with good and permanent results.

Sonnenberg (*Zeitschrift für Veterinärkunde*, part 10, 1917) had the care of 108 pregnant mares. Forty-three of the mares aborted, while the others gave birth to well-developed foals. Among the latter there was quite a number of cases of joint-ill. Thirty-nine foals had fever and of these 24 also had swellings of one or more joints. After the third outbreak of joint-ill all the foals were treated preventively with serum from their dams. Of the foals thus treated many were ill later and were again inoculated with the serum, but of the 65 foals treated only 4 died, all of these from thrombosis. Two foals died on the day after the treatment, the third died on the twenty-fourth day and the fourth foal on the sixty-seventh day. The first two had thrombosis of jugular vein; the other two had infarcts of the lungs. Sonnenberg thinks that this method has its greatest value as a means of prevention. It is not certain that a foal treated preventively will not be affected later on, but if it does, it will not be seriously ill. On the other hand it takes quite a long time to cure a foal not preventively treated.

Lieblisch (*Zeitschrift für Veterinärkunde*, part 4, 1918) is of the opinion that there are two quite different kinds of joint-ill in foals. He believes that the one kind is an infection through the navel with purulent processes and metastatic abscesses in the lungs and the liver, and less frequently disease of the joints. If any of the joints are affected there is, as a rule, a purulent inflammation with

abscesses around the joint. This illness can be prevented by carefully treating the umbilicus with iodine solution soon after the foal is born and continuing the treatment 3 times daily for the following ten days. Lieblisch also believes that good results have been obtained by giving the dam 10 grams iod. calic. per day. Thus the foal gets iodine with the milk, and this is said to have a good influence on the power of the foals to react against an infection of the navel.

The other kind of joint-ill Lieblisch believes to be a pre-natal infection, or an infection at birth. In his opinion this is the most common kind. Here synovitis is the rule. There is seldom any formation of pus in the joints; usually there is only a serous or sero-fibrinous infiltration in or around the joints and tendon sheaths. The clinical symptoms are the usual ones with general disturbances: Loss of appetite, rapid breathing, fever, and swollen joints and tendon sheaths, etc. In cases of this kind Lieblisch has obtained excellent results by treating the foal with the dam's serum. He reports 20 cases treated in this way. In 15 cases the foals were saved while in 5 the foals died. Four of the foals which did not recover were treated too late, and one was first treated preventively and again curatively on the second and third day after it had become ill. Lieblisch describes very minutely all the cases treated. Many of the foals had been very seriously ill. As a rule the serum was injected intravenously. In some cases he noticed that the foal, after the injection, showed symptoms of anaphylaxis. One foal, injected preventively, died in a few minutes after the treatment owing to apnœa. Lieblisch recommends the injection to be made with an interval of some minutes. At first he injects a small quantity, 20 or 25 c.c., then stops the flow by pinching the India-rubber tube for a minute or so, and the injecting can then be continued without any danger. The quantity of serum used by Lieblisch was 300 or 350 c.c.

John (*Zeitschrift für Veterinärkunde*, 1918, part 12) mentions two cases of lameness. The first was a nine-weeks-old foal with a swollen and sore hock joint, general disturbances and high fever (40° C., 104° F.). The foal was treated with 450 c.c. of the dam's serum intravenously. Result, complete recovery. In the second case the foal was ten weeks old and had had a suppurating affection of the coronet joint of the right hind leg for six days. By this time the left elbow joint had also been attacked. There were great general disturbances and the foal was unable to rise. It was treated with 450 c.c. of the dam's serum intravenously. The foal improved by degrees and in eight days it had entirely recovered.

Meyer (*Deutsche Tierärztliche Wochenschrift*, 1920, part 5) has treated six cases of joint-ill in foals with the dam's blood subcutaneously. In two of the cases the umbilicus was affected. In all the cases the diagnosis was quite positive. Two of them were of a very serious kind. In the first the foal was 17 days old and had been ill for two days. There were very great general disturbances and the temperature was 40.6° C. (105.1° F.). Both knees and three fetlock joints were swollen. Treatment, 400 c.c. of the dam's blood subcutaneously, but without any addition of citrate. In 36 hours the foal had entirely recovered. The second serious case was a long-standing one. The foal was 19 days old and had been affected with a swollen hock joint for six days, and the last two days the other hock joint and fetlock joints had also been swollen. There was a lameness and the foal had great difficulty in moving about. It was treated with 300 c.c. of the dam's blood subcutaneously. After five days the foal was able to run around the dam, and it gradually recovered completely.

Mieckley (*Zeitschrift für Gestütskunde*, 1913, part 10) has treated 20 cases of joint-ill with the dam's serum or blood. In 15 cases he obtained good results, but in 5 cases the foals died. The last 10 cases were treated with the dam's blood. All the foals in these cases recovered. The quantity used was 400 c.c., and it was injected intravenously.

Out of the 157 cases mentioned above 127 cases were treated with success while in 30 the foals died. Still it may be assumed that some of the unsuccessful cases could have been saved if the treatment had taken place at an earlier stage of the disease or if sufficient quantities of serum had been administered or the treatment repeated.

Of course it can never be imagined that in cases of joint-ill all the foals can be cured by this method, even if they are treated at an early stage of the disease. It is a well-known fact that all animals have not the same possibility of producing antibodies. In cases of infectious abortion in mares it has been shown, for example, by Glanders (*Deutsche Tierärztliche Wochenschrift*, part 21, 1920) that the serum of a mare which has aborted may not agglutinate the bacteria cultivated from the carcass of her own fetus. It has also been found many times that not all serum horses are well adapted for producing powerful serum. Thus it is not astonishing if the dam should not have antibodies enough to save her foal in a case of joint-ill. Besides, it may have been a common navel infection.

The ideal method of treating joint-ill in foals, as in cases of other infectious diseases, is, of course, to have a good serum produced by ordinary serum horses, but so long as this is lacking the method of treatment with the dam's blood or serum seems to be well worth trying.

SIZE OF MARE AFFECTS VALUE OF COLT

In urging stockmen to use dams of good size and quality a Missouri farmer contributes his experiences to an inquiry on the cause of runty livestock recently conducted by the Government. "A farmer or breeder," he writes "can not expect good results from breeding an undersized mare. A \$200 mare will produce \$200 to \$300 colts, while a dwarfed, undersized, imperfectly limbed and muscled mare will produce a \$50 colt that will not pay for its keep. My colts from 1,100 to 1,200 pound mares have been selling for \$150 when 15 months old. Colts are a farmer's delight if he will use his brains in the selection of good brood mares and breed to none but scientifically selected stallions with a record for good colts."

HEAVY LOSS OF HORSES

He was sitting on the curb, looking at his car, and as we passed by he greeted us so pleasantly that we must perforce stop and exchange a word with him, though he was a stranger.

"Car trouble?" we asked, idiotically.

"Lossa trouble," he acquiesced. "Gotta forty-horse power car there. An' thirty-nine o' them poor hosses is dead. Terrible eek—eek—eek—" he seemed unable to get any further, and he hiccupped.

"Terrible economic loss?" we suggested.

"Nope. Terrible eek-wine mortality!" he succeeded, triumphantly. "I had some o' this here, now, good-natural alcohol," he went on. "An' I'd otta've give some of it to the engine. But I drank it. An' now I only got one hoss left."

He seemed about to weep, so we left him.—*Cleveland Plain Dealer.*

The English scheme for licensing Thoroughbred stallions has now been in effect a year. During this time 193 stallions were examined and 10 refused licenses on account of ringbone, spavin, and other troubles.—*National Stockman and Farmer.*

THE BACTERIAL CONTENT OF THE GENITAL TRACT OF CATTLE, AND ITS RELATION TO CALF INFECTION¹

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ALTHOUGH the diseases of the genital organs of cattle have been investigated periodically for the last twenty years, no systematic bacteriological study of the entire female genital tract has been made. Valuable work has been done on the uterus alone and on the ovaries alone, but very little correlated material can be found in the literature of the subject. Some research has been carried out in comparing the flora of the pregnant uterus with that of the intestinal tracts of fetuses and calves. Work has been done also on the flora of the vagina. It is unnecessary to give a detailed history of this work, because what has been done as regards these diseases, which strike at the root of the reproductivity of domestic animals, is familiar to every one interested in the matter.

In 1904 Denzler (1), working at Stuttgart, did considerable work on the bacteria commonly found in the vaginae and also some bacteriological work on the entire genital tract. He records staphylococci, streptococci, and organisms from the colon-aerogenes group.

In 1919 Giltner and Bandeen (2) compared the bacterial findings from ten puerperal uteri with those from the meconia of calves from the same uteri. They say:

"Thirty-four organisms were isolated from the vaginae and twenty-four from the uteri. There were fifty-two different organisms isolated, only five of which occurred in both uterus and vagina. There were no two cows which showed an identical flora in either uterus or vagina, and there was very little similarity in the bacterial flora of any two cows, although they were all on the same premises. * * *

"Of the organisms found there were, of the four genera according to Migula: *Bacterium*, 22; *Bacillus*, 3; *Micrococcus*, 11; *Streptococcus*, 4."

There is an immense amount of work involved in an investigation of this kind, and it requires a long period of time. In my own work I have tried to determine four things: First, what organisms, if any, normally live in the organs comprising the female genital tract of cattle? Second, at what age of the animal do the organisms enter the genital canal? Third, what relationship exists between these microorganisms and the pathological changes associated with them?

¹ Presented at the Fifty-seventh Annual Meeting of the American Veterinary Medical Association, Columbus, Ohio, August, 1920.

Fourth, what effect is produced by these organisms on the fetus in the pregnant uterus or on the calf after birth?

In order to simplify the work, all the animals have been divided into six groups. Group I represents fetuses either aborted or removed from pregnant uteri. Group II is made up of calves from 1 to 20 days old. Group III comprises animals ranging in age from 3 to 12 weeks. The fourth group is virgin heifers; the fifth is non-pregnant cows, and the sixth is comprised of pregnant cows. More work has been done on Group V than on the other groups because of the greater ease with which the non-gravid tract is obtained.

The genital tracts of 114 animals have been cultured to date. Not all of these animals were normal. The tracts were collected from many different herds and abattoirs. Thirty-three came from animals that were slaughtered because they were non-breeders. The largest number coming from a single herd was 12, all of which were slaughtered because of sterility. Many of the other animals were reactors or beef cattle. The virgin heifers were shipped from the Middle West and slaughtered for beef. The group of 29 fetuses was made up of 13 females, 13 males, and 3 the sex of which could not be determined macroscopically because of their small size. One of these small fetuses was mummified. Fifteen of the fetuses were abortions, and 14 were removed from pregnant uteri, one of the latter being removed in a case of torsion of the uterus.

Cultures were made from the ovaries, oviducts, right and left uterine apices, body of the uterus, cervix, and in most cases from the vaginal folds around the external os uteri. At least four cultures, two aerobic and two anaerobic, were made from each. Not less than forty cultures were made from each tract except in the case of the smaller animals where the oviducts were so diminutive that it was practically impossible to culture them. In such cases the oviduct and ovary on the same side were crushed together and cultures made from the entire mass of crushed tissue. The testicles and epididymes of the male fetuses were crushed in Rosenow's tissue crusher and cultured. The alimentary tracts of the fetuses, including rumen, abomasum, small and large intestines, and meconium from rectum, were cultured. The heart's blood, lungs, spleen, liver and occasionally other parts of the fetus were cultured.

The technic of this work has been described in a former paper (3), but the essential points are as follows: The tract is removed from the animal carefully, placed on a sterile towel, and brought to the laboratory. In many cases, if the animal is small, the entire

animal is brought into the laboratory and posted there. Work done in the laboratory in this manner gives the best results.

After trying out many kinds of media, I have found that glucose-glycerin agar with a little sterile serum or defibrinated blood is the best medium to use. A large amount of the material to be inoculated is always placed in each tube. Sterile pipettes are employed in cases where there are fluids. Where there is no fluid, pieces of tissue are torn out with sterile forceps and transplanted on the medium. In order to obtain partial oxygen tension, in which the cultures from the genital organs seem to develop best, the cotton stoppers are either covered with sealing-wax or the tubes are placed in large jars with ground glass stoppers. An alcohol lamp is set in the jar and lighted; vaseline is smeared over the ground surface of the cover. The tubes are placed in the jar and the cover fitted on. The flame burns only until the oxygen has been consumed. The latter method is fairly satisfactory, but I have obtained better results with the sealing-wax, although this involves more work.

All cultures are incubated at 37° C. Examination is made practically every twenty-four hours, and as soon as a growth appears the tube is removed and the culture identified if possible. The contents of the uterus, unless it was empty, and also the fetal fluids contained in the alimentary tracts of fetuses, are injected into guinea-pigs. Other material suspected of being infected with *Bacterium abortus* is ground up with sterile saline solution and likewise injected into guinea-pigs. In three to four weeks the pigs are slaughtered according to Smillie's method of isolating *Bacterium abortus* from infected tissues (4).

A sample of blood is collected from most of the animals and set with *Bacterium abortus* antigen to see if the serum will agglutinate the antigen.

The results of this bacteriological investigation have been extremely interesting. The cultures from the genital tracts of the 26 male and female fetuses were uniformly negative, with the exception of the uterus of fetus No. 10, from which a Gram-negative short rod was recovered. Its morphology was similar to that of *Bacterium abortus*, and it agglutinated positive abortion serum in dilutions as high as 1 to 200. This case was of especial interest because *Bacterium abortus* was not recovered from any other organ in this prematurely expelled fetus. A *Staphylococcus albus* was recovered from the lungs.

Five aborted fetuses and 5 fetuses removed from pregnant uteri failed to give any bacterial growth from the various tissues cultured.

Three aborted fetuses showed pure cultures of *Bacterium abortus* from organs other than the genital organs. Three of the fetuses obtained from gravid uteri gave cultures of *Bacterium abortus* and streptococci. One of these fetuses was the mummified fetus, No. 20. Streptococci were recovered from tissues from 5 abortions and from 5 fetuses removed from pregnant uteri. Occasionally a staphylococcus or a member of the colon-aerogenes group was recovered with the streptococcus, but I did not find in this group a colon organism unless the fetus had lived for a short time. There was one exception—a fetus, No. 23, that was removed from a pregnant uterus in an abattoir. The cecum from this calf gave pure cultures of a 2-sugar colon. Fetus No. 18, which was expelled 42 days after the cow was bred, and fetus No. 19, which was only 2 cm. long, gave pure cultures of streptococci.

The cultures from the genital organs of the 6 calves were uniformly negative, with the exception of calf No. 6, which gave a pure culture of a streptococcus from the body and apices of the uterus and also from the folds of the vagina around the external os uteri.

The cultures from four tracts of the 11 veal calves were negative. A short Gram-negative rod, with morphology similar to that of *Bacterium abortus*, was recovered in pure culture from the uterine cavities of veal calves Nos. 1 and 10. One culture was agglutinated by positive abortion serum at 1 to 500 and the other in dilutions of 1 to 200. An apparently identical organism was found in pure culture in the udders of Nos. 9 and 10. Staphylococci were recovered from the oviducts of two of these calves, Nos. 1 and 3. The ovaries gave pure cultures of streptococci in two cases and of staphylococci in three cases. From the ovary of one calf a *Staphylococcus aureus* and a streptococcus were recovered. The mucus from the anterior part of the vagina in one case gave a pure culture of streptococcus, while the remainder of the tract was negative.

The genital organs of the group of virgin heifers were, on the whole, almost entirely free from bacteria. Cultures from 5 of the 6 animals were negative throughout. One heifer, No. 2, gave a pure culture of a streptococcus from the uterine apices and both tubes.

Group V, in which I have included 56 non-pregnant animals, is of marked interest. I will mention first the bacteriological results obtained from the 12 sterile cows slaughtered in one herd. These cows varied greatly in age, four or five being heifers that had never conceived. All had been regularly doused and otherwise treated for sterility for many months. All of the organisms isolated from

these animals come in the group of cocci. The majority were streptococci coming chiefly from the oviducts and ovaries. Occasionally a pure culture of a streptococcus was recovered from the anterior portion of the vagina, the cervix or the uterine apices. In a few cases a staphylococcus was recovered in pure culture from various organs of the genital canal, but usually a streptococcus was recovered with it.

The remaining 21 sterile cows were collected from various herds. All of these were slaughtered after being condemned for incurable sterility. All had received treatment of various sorts for sterility. For the most part the bacteriological findings were similar to those of the first-mentioned group of 12 sterile cows. The predominating organisms were cocci, chief among them being the streptococcus. Staphylococci and occasionally a sarcina were recovered, but in nearly every case these were mixed with the streptococcus. In the oviduct of one cow a paracolon organism was found, and in a case of hydrosalpinx an organism from the colon-aerogenes group was isolated in pure culture.

The remaining 23 cows, slaughtered for various reasons, showed fewer bacteria in the anterior parts of the genital canal, namely, oviducts and ovaries, than the same organs of the non-breeders showed. The anterior part of the vagina, cervix and uterus yielded more bacteria than did the same organs of the non-breeders. This may be accounted for by the fact that the non-breeders had been douched, while the majority of the others had not received any attention. *Bacillus pyogenes* and *Bacillus aerogenes capsulatus* were recovered respectively from two cases of pyometra, but in each case a streptococcus was mixed with the organisms named. *Pseudomonas pyocyaneus* was recovered from the uterus of one cow. *Bacterium abortus* was found in the udder of one heifer that had never conceived. The Bang organism was obtained also from the cervix and uterine cavity of an abattoir cow that had been suffering from a severe granular vaginitis and cervicitis. In one or two cases a spore-bearing rod was recovered from the cervix, and a Gram-positive bacterium, which I was unable to identify, from an ovary. Only 6 tracts of the 56 animals were found free from bacteria. Two of these tracts were from non-breeders. The genital tracts of the other 4 were apparently normal with the exception of one ovary in a heifer, which contained a large hematoma.

Group VI is composed of pregnant animals. Two of the 6 animals yielded no bacteria in cultures. Two gave pure cultures of streptococci from the uterine cavities. A pure culture of *Bacterium*

abortus was recovered from the fetal fluids of No. 5, and a Gram-negative rod, resembling *Bacterium abortus* in every respect except that it was not agglutinated by positive abortion serum, was recovered from the uterus of No. 6.

DISCUSSION AND SUMMARY

Streptococci have been isolated from 138 different parts, staphylococci from 78, *Bacterium abortus* from 29, organisms of the colon-aerogenes group from 4, *Bacillus aerogenes capsulatus* from 3, *Bacillus pyogenes* from 3, sarcina from 3, *Pseudomonas pyocyaneus* from 1, and saccharomyces from 1.

From these data it seems that the genital tracts of cattle should normally be free from bacteria. The results obtained from the younger animals seem to support this theory, although microorganisms are sometimes found in their genital organs. The genital tract of a fetus or young calf is almost completely filled with a very viscid, tough, clear mucus. In adults there is less of this mucus except at the estrual period. Denzler (1) states that this secretion has a marked bactericidal action. He injected cultures of various live organisms into the vaginae of calves and of pregnant and non-pregnant cows. At intervals after doing this he collected some of the vaginal secretion and cultured it. He found that after a certain number of hours he was unable to recover in cultures the organisms which he had injected into the vaginae. He concludes as follows: "The vaginae of calves, non-pregnant and pregnant cattle possess the power of cleansing themselves." He goes on to state that the vaginal secretion is a barrier against invading organisms.

There is no doubt that some bacteria enter the upper genital canal per vaginam, but it does not seem incredible that some microorganisms enter the genital organs from a hematogenic source. The literature concerned with human gynecology cites many instances where the streptococcus has been carried to the genital organs from other infected areas by the blood.

The genital tract of the adult cow, on the whole, does not seem to be teeming with living bacteria. As a rule only a few colonies have been noted on most of the cultures, or perhaps a meager growth. This is especially true of the streptococcus which has been recovered so many times. It may be due to the artificial medium upon which it is grown. The biological characteristics of the many cultures of streptococci isolated in the laboratory have been quite uniform. They are short, oval streptococci, producing green zones when grown on blood plates. Occasionally a hemolytic streptococcus has

been recovered, but this is rarely found unless associated with a pyogenic condition.

Streptococcus viridans was found in the oviducts of non-breeders. Clinical examination revealed the oviducts to be normal, and after the tract was removed no abnormality of the tubes could be seen until microscopical sections were made and studied. Then it was found that the lumen was completely closed, being filled with connective tissue and blood vessels. In many cases where the tube appeared normal macroscopically, histological sections revealed complete destruction of the mucosa. Whether the streptococcus is the chief offender as regards these conditions can not be wholly proven from the amount of work that has so far been done, but it is associated with them and should be incriminated. Very few cattle have been available for testing out the pathogenicity of this organism. A few calves were used, but the work has not progressed far enough to report upon at this time. If the streptococcus does not cause any trouble, it has remarkable power to withstand the normal bactericidal action of tissues and secretions from the genital canal.

I have not called an organism *Bacterium abortus* until I have injected it into guinea pigs to see if it produced the characteristic lesions, made antigens from the cultures and checked them against positive abortion serum and worked out its biological and staining characteristics.

The recovering of *Bacterium abortus* in the uterus of one aborted fetus and from the udders of two veal calves and one sterile 4-year-old heifer interests me. The length of time this organism persists in the genital organs has been reported to be comparatively short. What interpretation may be placed upon these findings can not be stated at this time. I think that a thorough bacteriological study of the udder should be carried out in connection with that of the uterus, oviducts and ovaries. I have tried to do this, but have failed, in many instances, to obtain the udder in a fit condition to culture.

The most striking fact is the rarity with which organisms from the colon-aerogenes group have been recovered. These are easy organisms to cultivate and if they had been present they would have been found. Except for cultures isolated from the intestinal tracts of calves and fetuses that lived for a short time, I have obtained only 4 cultures of these organisms out of 260. Three were recovered from oviducts and one from the cecum of an aborted fetus. If calves suffer from intra-uterine infections, it seems hardly probable that this group of organisms can cause much trouble. Even if calves are caught on disinfected or sterile pieces of canvas and kept in a

surgically clean environment, they will develop intestinal disturbances—pneumonia, or whatever form the disease happens to be taking in that particular herd. I have tried, with many cultures, to produce these symptoms in young calves, but have failed in every attempt. In three recent outbreaks of these infections in calves I was unable to isolate the colon organism if the calves were killed and cultured a short time before death seemed evident, or even immediately after death. I inserted a sterile soft rubber horse catheter into the rumen and siphoned out some of the contents as soon as the calf was dropped. The material so obtained yielded a streptococcus. The meconium and blood cultures and the placenta from the dam gave the same organism. In these herds cultures from calves that were expelled dead gave an organism identical with that recovered from living calves.

There is one type of calf infection that is apparently due to unclean food and insanitary surroundings. It is easily controlled by adopting sanitary methods and by disinfecting the navel cord. There is also a chronic type in which the calves do not thrive from 3 to 6 weeks. They may develop pneumonia or die from chronic intestinal disturbances. I believe that the organisms from the colon-aerogenes group play a part in these two types of infection, but I do not consider them the primary causative agent.

It seems as if there must be some unknown factor at work in producing these morbid conditions in the reproductive organs of cattle and in the life of the new-born calf. I can not see very much etiological relation between these conditions and the majority of the organisms isolated. The work is being continued and it is hoped that further research will throw more light on some of these problems.

I am indebted to Dr. H. L. Gilman for the pathological work on the oviducts.

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OBSERVATIONS ON THE EGGS OF DICTYOCAULUS FILARIA¹

By HOWARD CRAWLEY, Philadelphia, Pa.

CURTICE (1) states that the eggs of *Dictyocaulus filaria* (which he designates as *Strongylus filaria*) are ellipsoid and measure 75 to 120 microns long by 45 to 82 wide. On his Plate XXXIV are shown four figures of the eggs. Of these, figure 11-d, which shows an embryo coiled up into a figure 8 and completely filling the shell, is entirely accurate.

Railliet (2) agrees with Curtice in saying that the eggs are ellipsoidal, and gives their dimensions as 112 to 135 microns long by 52 to 67 microns wide. He states that when laid they contain a living embryo the movements of which continually cause deformations of the thin shell. This same author also published five figures of the egg, two of which show it containing an embryo. But these figures are not accurate, since they give the impression that the embryo only partly fills the shell.

Neumann (3) lists this worm (p. 494) as *Strongylus filaria* and on page 495 copies Railliet's figures.

Neveu-Lemaire (4) gives two figures of the egg, also copies of those published by Railliet, and the descriptions and dimensions which he publishes are also the same as those of Railliet.

Combining the data given by the authors, the eggs of this nematode are ellipsoidal, measure 75 to 135 microns long by 45 to 82 microns wide, and the shell yields to the movements of the motile embryo.

The observations to be herein described are based on specimens of this worm taken from the lung of a sheep, No. 10646 of the series of specimens received at the Laboratory of the State Bureau of Animal Industry. This animal was received alive, and died while under observation, but while the lungs were obviously affected by the presence of the worms, it was not possible to say that these were the cause of death, since both stomach and nodular worms were also present. The worms taken from the bronchi were placed in 4 per cent formalin and kept in this preservative.

It is desired to state at the outset that the measurements and descriptions are valid for this particular lot of eggs but not necessarily valid for all eggs of *Dictyocaulus filaria*. This reservation is made because certain observations made in the State Laboratory

¹ Contribution from the Bureau of Animal Industry of the Pennsylvania Department of Agriculture, New Series No. 1.

indicate that there is a tendency for the ova of a particular nematode from one particular host to differ somewhat in size from those of this same nematode from another host. A paper giving data in support of this statement is in preparation.

To prepare them for study the worms were taken from the formaldehyde solution and transferred for a day or two to a medium composed of alcohol and glycerine. They were then mounted on slides in a medium the formula of which is: Carbolic acid, 1 part; lactic acid, 1 part; glycerine, 1 part; water, 2 parts. The effects of this are to clean up the opacity of the worms and thus render them easy to study.

In mounting the worms some of them became broken, with the result that the uterus was forced outside of the worm and a certain number of the eggs became free on the slide. In addition it necessarily happened that in transferring the worms to the preservative there was transferred with them a certain amount of the bronchial mucus, and this contained eggs. It thus came about that in the mounts some of the eggs lay free on the slide, while others were still contained in the uterus, whether this lay in an intact worm or had been forced out of its proper position. This point is emphasized because it has certain significance.

Perhaps the next interesting feature which was brought out with regard to these eggs is that their cross section is not round but elliptical. This was not suspected at first, and 100 eggs were measured as they came, partly those free on the slide, and partly those still within the uterus. These measurements gave the following results: Average, 125 by 73 microns; longest egg, 135 microns; shortest, 110 microns; broadest, 85 microns; narrowest, 57 microns. These figures agree with those already published with regard to the maximum length and width, but not with regard to the minimum. Thus Curtice's minimum figures are 75 microns for the length and 45 microns for the breadth. None of the eggs in the material examined by me were so small as this, and it is permissible to suppose that they refer to the eggs of some other nematode present in the material studied by Curtice.

As seen by the figures published, there are two different ways in which the embryo appears to be arranged in the egg. In the one case it tends to present an appearance which suggests a figure 8, or perhaps better, a pretzel (figs 1, 2, 3, 4). In others (figs. 5 and 6) the appearance is of a worm folded once or twice with one of the segments more or less concealing the others. It is entirely evident

that if the embryo in the former condition were tilted through 90 degrees it would present the appearance of the latter.

It is also to be noted that those eggs in which the embryo presents the appearance of the figure 8 or pretzel are broader than the others. The next step taken, therefore, was to measure two sets of 20 eggs each, the one set composed of eggs such as are shown in figures 1 to 4, the other set of eggs agreeing with figures 5 and 6. For convenience the former may be designated as measured "on face," the latter as "on edge." These two sets of measurements gave—

	Eggs on face	Eggs on edge
Average	125x77	125x60
Longest egg.....	133	133
Shortest egg.....	120	118
Broadest egg.....	82	68
Narrowest egg.....	72	53

The lengths are identical, while there is a great variation in the width, the broadest egg measured on edge being narrower than the narrowest of those measured on face.

In order to confirm the fact that the eggs actually do have an elliptical cross section, and not that they fell into groups both with circular cross sections but one with greater diameters than the other, selected eggs were forced to roll in the mount by moving the cover-glass with a needle. In such cases it was noted that the breadth varied as the egg rolled, and in all cases it was greater when the egg (as determined by the aspect of the embryo) was viewed on face than on edge. In one case observed, the breadth of a selected egg changed from 74 to 66 microns, a difference of 8 microns. This is less than the difference of 14 microns given in the table, but the observations are difficult, the egg tending to come quickly to rest on one of the flat sides.

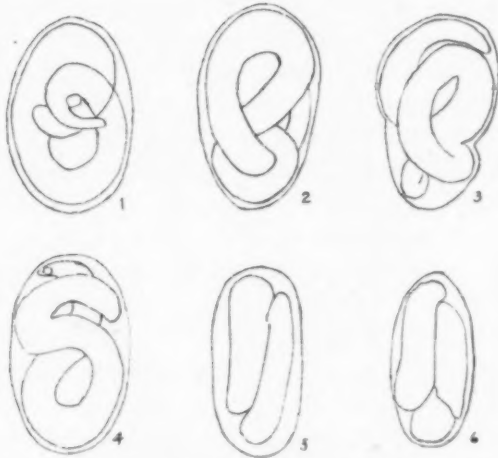
It is also to be noted that nearly all of the eggs lying free on the slide presented the appearance shown in figures 1 to 4. This is obviously merely a matter of physics; a flattened object when free to move will come to lie on one of its flat sides. But in the uterus the eggs, owing to the fact that they are very closely packed together, are not free to assume such a position; therefore it is in the uterus that the apparently narrower eggs are to be looked for, such as are shown in figures 5 and 6.

Amongst the lot of 100 eggs mentioned above, it was noted at the time the measurements were made that 6 were in either the morula or gastrula stage. These were in all cases narrow, the broadest being only 68 microns wide. In consequence 10 other eggs, either

prior to or in the course of segmentation, were measured with the following results: Average, 119 by 63 microns; longest, 131 microns; shortest, 104 microns; broadest, 68 microns; narrowest 57 microns.

The average length is here a little less than that of the eggs containing embryos. The breadth corresponds to that of the eggs measured on edge. It was not possible to make accurate determinations, but the assumption is that in those eggs the cross section is round.

What apparently happens is as follows: As the embryo evolves itself out of the gastrula, its transverse growth is greater in one plane than it is in the other, so that, as already stated, the embryo assumes the form of a pretzel. It thus presses upon the inner wall



Eggs of *Dictyocaulus Filaria*

of the shell in two opposite directions, and the shell yields to this pressure and is permanently held in an asymmetrical form by the embryo which it contains. The somewhat greater length of the eggs containing embryos over those in earlier stages of evolution is probably to be accounted for in the same way.

The quotation from Railliet shows that the shell yields to the movements of the embryo. I was not able to repeat this observation, since in the material at my disposal the embryos were not motile. But in a great many eggs it is easy to see that the shell has yielded to pressure from the embryo, it being more or less bulged out where a portion of the embryo has come into close contact with it (fig. 3).

Ignoring irregularities produced in this way, the fundamental form of the eggs viewed on face is elliptical. At times, however, there is a tendency to assume a more or less ovoid shape (fig. 2), and in such cases one side may be less convex than the other, at times almost flat. The eggs seen on edge are sometimes ellipsoidal, but also sometimes sub-cylindrical; that is, elements with straight or nearly straight sides and rounded ends.

The shell shows a double contour, the outer boundary sharper and more distinct than the inner. It is about $1\frac{1}{2}$ to 2 microns thick, as closely as is possible to measure it.

SUMMARY

1. The eggs of *Dictyocaulus filaria* average 125 microns long, the extremes of those containing embryos being 135 and 110 microns.
2. They are not symmetrical, the cross section being an ellipse and not a circle. The average of the longer diameter is 77 microns, the extremes being 82 and 72 microns. The average of the shorter diameter is 60 microns, the extremes being 68 and 53 microns.
3. The outline, viewed from one of the flat sides, is fundamentally elliptical, at times somewhat ovoid. Viewed on edge it is elliptical or sub-cylindrical.

EXPLANATION OF FIGURES

Fig. 1.—Figure 8 or pretzel appearance. Typical of many eggs. Actual size of this egg, 129 by 85 microns.

Fig. 2.—Much as figure 1. Egg slightly oval. Actual size 133 by 80 microns.

Fig. 3.—Shows distortion of shell by pressure of the contained embryo. Actual size 131 by 80 microns.

Fig. 4.—Ellipsoidal egg. Actual size 133 by 80 microns.

Fig. 5.—Egg seen on edge. Actual size 127 by 62 microns.

Fig. 6.—Egg seen on edge.

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The cackle of a hen when she lays an egg, says a scientist, is akin to laughter. And with some of the eggs we have met we can easily guess what the hen was laughing at.—*London Punch*.

ANIMAL HUSBANDRY IN THE VETERINARY CURRICULUM¹

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ANIMAL husbandry in the veterinary curriculum is a subject that deserves much more attention than it has received. The more one studies this subject the more its importance will be appreciated.

There is a general belief among our leading veterinarians and livestock men that the veterinarian of the future will be a broad-minded animal specialist. He will be what Dr. Leonard Pearson was pleased to term an "animal engineer." He will not only be well trained in the subjects of veterinary medicine but he will also be a trained animal husbandman. Such a man would be an important asset to any farming community and should occupy a place of considerable importance and responsibility. He would be able to speak to the stockman in his own language and render him valuable service in handling livestock problems. If he is not capable of doing this he will often find himself in disagreeable situations.

That was the experience of a veterinarian known to the writer. When this man graduated from a veterinary school, although he had had the average farm boy's experience, he found that his knowledge was too limited to be of value in the promotion of agriculture. He was located in a section where all the farm animals were scrubs or grades and the people were anxious for someone to tell them how to improve their livestock and practice better farm methods. At first he missed many excellent opportunities for helping these people. He knew but little about the production of horses, therefore, when a group of his prospective clients wanted to buy a purebred stallion to use in the community, he had no clear idea of what type or breed to recommend, where the most desirable animal could be purchased, or what price should be paid for it. A firm of importers sent a representative to his community with a horse to sell. The veterinarian was unable to judge whether the animal had the proper quality, conformation, etc. The horse was sold for much more than it was worth to this group of enthusiastic but credulous farmers who were willing to put up the money. They, like most companies of this sort, lost all they put in it, and the horse industry in that vicinity was given a serious blow from which it has never recovered.

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Later certain farmers in his territory desired to improve their stock of dairy cows. They made a serious mistake because the veterinarian was not conversant with the principles of breeding. He encouraged them to buy heifers which were to be bred to a close relative. It happened that some unfavorable genetic factor in the make-up of these animals was brought to the surface by inbreeding. This resulted in a complete failure and gave the purebred a bad reputation. A man familiar with the principles of breeding would never have made such a mistake. He would realize that the constructive breeder would consider such a mating a hazardous experiment. In both cases an excellent opportunity was offered this veterinarian to have rendered his clientele valuable services which might have resulted in a permanent improvement of the livestock in his community and at the same time establish for himself an enviable reputation.

The modern veterinarian is expected to have the right kind of knowledge on such subjects. Too many are deficient in the principles of breeding, feeding, judging, etc. We should have expert knowledge of the things mentioned and be acquainted with the breed history of our domesticated animals and the best families in each breed. We should also know the types and breed characteristics. A man once said, "If a veterinarian should look over the fence and remark that a certain Poland China sow was a pretty good Berkshire, it would probably shake his client's confidence in his ability as an animal physician."

In addition one should know the principles of horsemanship, have a knowledge of the various bits and their functions, and of saddles, seats and harness; how to dress animals for the show-ring and how to show them. Such subjects as soils and maintenance of soil fertility, care, management and feeding of livestock, construction and ventilation of farm buildings, should also be a part of a veterinarian's education. If one hopes to measure up to the maximum requirements of the times he should take a thorough course in animal husbandry. Such course should be considered one of the important parts of the veterinary curriculum.

There should be the closest coöperation between the veterinarian and the county farm agent. The county agent handles the problems of the farmers in a general way. He can not visit all farms and get into close contact with every farmer. His field is too large to permit such detailed attention. The veterinarian comes into more intimate contact with the farmer. It will be mutually helpful to the veteri-

narian and the county agent if they coöperate fully in their work.

The following statement made by Wayne Dinsmore, former Secretary of the Percheron Society of America and now Secretary of the Horse Association of America, indicates how the stockmen of the country feel on this subject. He says:

"I am frankly of the opinion that veterinarians need this work as much as animal husbandry students in the regular agricultural colleges do; for long experience has satisfied me that veterinarians oftentimes do themselves great harm through lack of knowledge of recognized breeds and types of horses and through their inability to judge intelligently of the relative merits of two horses when viewed from the standpoint of practical horsemen. It is regrettable, but none the less true, that horsemen generally consider veterinarians, as a class, very poor judges of horses, whereas they should be particularly well qualified if they are to do justice to their profession. To sum the matter up in a nutshell, in my judgment veterinarians should have the most rigorous, exhaustive training in animal husbandry work, particularly in horse judging and in feeding and management of horses of all types; but the work should be thorough or not given at all, for a little knowledge is a dangerous thing, and a veterinarian who has had a smattering of judging work is the most obnoxious man among horsemen that can well be imagined. You may well emphasize also that it takes time and persistent study of large numbers of animals to develop men into satisfactory horse judges. They must study the best types of each class and each breed and by persistent study of the ideal learn to recognize inferior types at a glance, but there is no short road to learning in this particular line. The great fault with nearly all of the veterinary schools that give any work in horse judging is that they attempt to give in three months the work that the agricultural colleges take three years to cover."

What has been said by Mr. Dinsmore indicates the need and demand for a comprehensive animal husbandry course in the veterinary curriculum.

At the University of Pennsylvania we feel that we have been devoting sufficient time to all animal husbandry subjects, except practical judging, and we have just added another two hours per week for one year, so we hope for better results in that branch in the future. The work is given as follows:

The students begin studying animal husbandry the second semester of the first year. The first subject is equitation. Dr. Gay's "Productive Horse Husbandry" is used as a text-book with two one-hour recitations per week for eight weeks. We study the requirements of a good stud, construction and management of stables, care and management of the breeding stock, horsemanship,

bits and biting, riding and driving, seats and saddles, the classification and construction of vehicles, transportation and showing. Then the practical work begins. The students are taught how to splice rope, tie a few useful knots, and make three types of rope halters. Work in fitting bridles, halters, collars and harness is given next. After this they are taught how to approach a horse, lead, show him and measure his height; how he should be cleaned and feet and legs cared for, and how to decorate mane and tail for the show ring. We conclude this part of the work with a horse show. Each student is required to clean, decorate and show a horse. A prominent horse breeder acts as judge and a prize is given to the student winning first place. The students are then required to take five riding lessons at one of the best riding academies in Philadelphia. How to handle sheep in the show ring and set them up on their rumps is also taught in this course.

Market types and classes is the subject taught the first semester of the second year. Prof. Vaughan's book is used, with two one-hour recitations per week, and one afternoon per week is devoted to practical judging at the Philadelphia livestock yards. Two one-hour recitations per week, second semester, is devoted to the study of the origin, history, development, breed characteristics and economic importance of the breeds of horses, cattle, sheep and swine. Prof. Plumb's book is used as the text. Practical judging of breeds is done on near-by farms one afternoon each week.

Feeds is the next subject considered. Two one-hour periods the first semester, third year, are devoted to this work. At this time the study of the origin, classification and characteristics of our soils and the maintenance of soil fertility is introduced. This is given in the form of lectures and demonstrations. Following this we use Henry and Morrison's "Feeds and Feeding" and have recitations on the classification of feedstuffs, their production and preparation. The following semester two hours per week are devoted to feeding, which includes the economic production of horsepower, beef, milk, mutton, wool, poultry, eggs and by-products, also the care and management of the herd and flock. This work is given in the form of lectures and recitations.

Breeding is studied next, two lectures per week, fourth year, first semester, on the history, principles and practice of breeding livestock. A general course in genetics is given as a basis for this work.

One afternoon per week, for twelve weeks, fourth semester, is used for visits to stock farms in near proximity to Philadelphia, for

advanced judging of types and breeds of horses, cattle, sheep and swine. This affords our students an opportunity to see some of the best specimens of many breeds, the most modern farm buildings and their equipment, and a chance to observe the manner in which they are cared for.

There are several ways in which veterinarians who have had no training in animal husbandry can become proficient animal engineers. They can read such papers as the *Breeder's Gazette*, *Hoard's Dairyman* and the *National Stockman and Farmer*, and attend county fairs and large livestock shows like the International Livestock Show and the National Dairy Show. They can organize boys' and girls' calf and pig clubs or local livestock associations or cow-testing associations. By starting organizations of this kind, interest in livestock would be stimulated in the community and the veterinarian would learn a great deal about animal husbandry.

The following books could be studied and a broad knowledge of the subject gained:

Origin and Influence of the Thoroughbred Horse, by Ridgeway.

Types and Breeds of Farm Animals, by Plumb.

Productive Horse Husbandry, by Gay.

Types and Market Classes of Livestock, by Vaughan.

Feeds and Feeding, by Henry and Morrison.

Farm Management, by Warren.

Physical Basis of Heredity, by T. H. Morgan.

Genetics in Relation to Agriculture, by Babcock and Clausen.

Soils and their Properties, by Lyon, Fippin and Buckman.

DISCUSSION

CHAIRMAN HILTY: This is a paper that should be discussed. I am going to ask Dr. Hoskins to open the discussion.

DR. HOSKINS: This is a very interesting paper, the most interesting of the kind I have heard. When we look back to the days when Dr. Hilty and some others of us were in the veterinary schools, animal husbandry and industry were almost absent from the curriculum. Today it is of paramount importance in our veterinary schools, for the reason that veterinary medicine is the service of the domestic animals that furnish our great food supply, while we here in our meeting are constantly being reminded that the place of the veterinarian and the place of veterinary medicine is closely allied to agriculture.

Being connected with a school located in a large city, during the last three years, and coming in contact with a great many men in that State, from the lowest to the highest walks of life, it has been almost tragic to realize how little the average man in the other professions knows of the value of the veterinarian and of veterinary medicine. The problems of

food and raiment are far more difficult in the large cities than they are in the country, and from this I have sensed the reason that our veterinary schools are not adequately supported and equipped. It is because of the paucity of knowledge of the large mass of the people, and those of the higher walks of life in the large cities. These problems come with greater intensity to the larger population in our larger cities. So that we must get the legislative bodies to work, and we must make our needs and wants known, and educate these people as to our wants and needs and our place in civilization.

Speaking of the veterinary schools, I am aware that most of those and also the agricultural schools have been struggling the greater part of their life-times. When you think that in the great Empire State of New York, with its millions and millions of people and twelve millions of acres of farm lands, 40 per cent of the tenants farming, more farm mortgages than any State in New England and the Middle States, that these ten millions of people are spending so small a sum of money upon the problems of economic veterinary medicine, spending much less in veterinary culture and police control work than many much smaller States, and some with less than a million inhabitants within their borders, it gives one some conception of how little is known of the value of veterinary medicine by the great majority of these ten millions of people.

The proposition made today by the Committee on Intelligence and Education, which I discussed at some length with two members of that committee, relates to a campaign to educate the people to realize how absolutely they are dependent for food and clothing upon economic veterinary medicine. Many of the men who go into our legislative bodies are from the larger cities and towns; they do not know what economic veterinary medicine stands for, and are perfectly indifferent to the appeals of those engaged in agriculture for relief from the great economic losses that they suffer. It is very timely indeed that all of the schools, within the first and second year particularly, be given a course in animal husbandry and industry.

There is another reason. With the high requirements of our schools 90 per cent of the future students will be young men between the ages of 17 and 22, and a goodly proportion will not come from the farm; they will come from the high schools of the cities and towns. So we are not going to have as large a proportion of the student body with the aptitude for the profession that we have had in the preceding years in the organization's history. A large percentage of the student body in my day were young men from the farm, from the rural communities, whose lives had been, up to the time of their entrance into the veterinary school, associated with animal industry in some form.

New York State loses many domestic animals, and the losses amount to from five to ten millions of dollars a year. I told members of the Legislature in Albany last year that if that were the problem of a great corporation that had a loss of over ten millions of dollars a year, they would put in somebody at a salary of \$25,000 a year to solve those problems. They are problems to the man on the farm, and they are problems to the people in congested centers, for the reason that the cost of these losses to the individual falls upon the shoulders of the consumer.

DR. GLOVER: I have listened with much interest to the remarks of the essayist and Dr. Hoskins. I agree with the remarks and think their truth should be appreciated. The question is, How are we going to do this? Frankly, I don't see how we are going to get the time for these subjects in the schools. We have all the semesters filled, and we would have to take the time that is now devoted to major subjects of veterinary medicine. Our students are in college primarily to learn the science of veterinary medicine, and there are just so many hours devoted to it, and at present we don't feel that we are getting enough time.

I fully realize where the veterinary profession is weak. I know personally of qualified veterinarians who have gone to some places to practice and have not had the work, and have been obliged to pull up stakes and leave. Why? Because other men who were there knew how to handle the farmers, and the college men did not. We talk about a lack of professional information, and we seem to be inclined to try to force an issue. We want to force the farmer to appreciate the value and importance of the educated veterinarian. We are getting the cart before the horse. It seems to me that whenever the time comes that we can produce a graduate veterinarian who can render the service that will be appreciated, we will find professional recognition will come, and that the demand for veterinarians will increase, and we will not need to run advertisements in our farm journals in order to interest the farmers in the veterinary question. We have got to get at this thing from the right end. And the question is, How are we going to do it?

The other suggestion is that these veterinarians should be broad-minded men, representative men, able to meet the classes of people who are interested in something besides the doctor business. I think you will agree with me that many veterinarians come out from the colleges thoroughly imbued with the one idea that they have to doctor, that they are doctors; but I believe that the veterinarian should cultivate the social side and not only the side of the practitioner. A man who practices veterinary medicine must be a mixer, must have an education, must be able to go to a farm and make himself agreeable. A veterinarian, when he goes to a farm, should be liked, he should be welcome, and he should know that if he wants to get on the good side of the farmer he must pay some attention to the man's livestock, and he must pay respectful attention to the man's wife—but not too much; and if he wants to get the good favor of the wife he must notice the children; and if he wants to get in the good graces of the children he must notice their pets and toys.

These things may seem foolish and absurd, but they are not. It is all in the line of food for thought. I know a man who located in a small town in Wyoming. He was in good standing and seemed to be successful, but when he met the farmers on the road he gave them a respectful bow; he had not been brought up to know the farmer and the farmer's wife and children and their pets. But finally another veterinarian came there and he soon knew everybody, and made it a point to make himself agreeable and pleasant; and the first fellow stayed only about three months.

What can we do as educators to imbue our students with the importance of being broad-minded fellows, and to know something other than the science of the doctor's business? I think that is the important thing for us to consider; and I would advise you to devote no more time to animal husbandry than the four years' course in veterinary medicine, for we can not at the present time do it.

DR. MURPHEY: There are some other results which have been brought out in this paper regarding the course of animal husbandry that I think should be emphasized a little more. This discussion has been illuminating on some points. We do not give the amount of attention that we should to feeds and feeding. The internal diseases are found to be of more importance on account of the character of the feeds than anything else. Individual feeding has passed.

One of our problems is to get a little more time in the curriculum. You know the President of the Association says there is too much time devoted to the academic; that we should take out some of the old courses; that if we would do that we would get the time for these extras. I find in therapeutics we get some of the histology. We use that in order to tell the students how to destroy parasites. We have to tell them about the histology so that they will understand the pathology, and they take up pathology so that they will understand the diseases.

One of the things that pleased me more than I am able to tell in a few words is the chance for the students in animal industry. I know that as a student I did not get interested in the things which I was told about animal industry.

In Ohio the head of the Bureau of Animal Husbandry work is a veterinarian. You all know well of the lectures carried on by Dr. Gay, the animal husbandry man, and at the University of Pennsylvania the veterinary students are presided over by an animal husbandry graduate who is also a veterinarian. This work could be done in all departments when it is at all possible, with all subjects that touch on veterinary science, or more particularly when you can get a good veterinarian. I think that we can rest assured that some of the men interested in animal industry will work a reform, without teaching misconception, and with much advantage to the veterinary student. I think this has been a good paper, and many good things have been brought out on this topic.

A writer in *Holstein Friesian Register* says "The Chinese have never had a dairy breed of cows, and only recently have begun to 'cultivate the practice of using that most valuable food for children (milk) through the use of tinned milk from Europe and America.'"

"Humboldt County, Calif., has a milk-goat association, which has negotiated for the services of a cheesemaker from the Alps. They will shortly commence the manufacture of goat-milk cheese, and, if a market be established, goat-milk butter. The butter from goat milk is said to be higher in vitamins, as it is not necessarily pasteurized."

THE RESPONSIBILITY CONFRONTING THE VETERINARY PROFESSION¹

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THE protection of a ten billion dollar livestock industry in the United States from the devastation of disease and from an inestimable loss of animal life and valuable property in an industry which supplies material for food and clothing for more than one hundred millions of people besides the food and clothing exported to foreign lands; the economic, industrial, commercial and financial considerations involved; the safeguarding of human health and life from infection and infestation of animal origin, to say nothing of humane considerations connected with the alleviation of animal suffering and prevention of cruelty, and other outstanding features of veterinary work, do not by any means constitute the full responsibility resting upon the veterinary profession.

A new rôle and a new responsibility have come to this noble calling, if we would lift it to still higher levels of service and achievement. The demand of the hour is for a greater production and conservation of every kind, but before we can have food and clothing, animals must be bred, reared, fed, grown and converted into suitable form for the use of mankind. It is not simply the propagation of livestock on a larger scale that is needed, but a more intelligent application of the principles of veterinary science to breeding problems, to the end that a better, a more plentiful, a more economic, a more nutritious, as well as a more healthful food supply may be available. The principles of veterinary science must be applied not only to breeding operations, but also to furnishing a balanced ration, providing proper rearing and general management of livestock. It is absolutely impossible for animal husbandry and industry to reach its highest state of development and attain maximum economy and efficiency without the potential aid of veterinary science in the whole realm of animal breeding and rearing, as well as livestock management in general, including transportation problems, exhibition of livestock, judging livestock, marketing and all other branches of the animal industry.

Such knowledge is now sought and appreciated by agriculturists, breeders, stockmen, feeders and dairymen to a greater extent than

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ever before; largely because agriculture is rapidly being placed upon a scientific basis through the instrumentality of the State agricultural colleges, experiment stations, the Federal Government, extension work, the activities of the trained county agent, and last, but not least, the establishment of agricultural departments in rural public high schools. All this is bound to lead to an appreciation, recognition and demand for the services of the trained veterinarian unheard of in the past.

Do not let us lose sight of the fact that with all its splendid achievements the veterinary profession is only in its infancy in this country. The opportunities for the adequately trained veterinarian will increase with the advancement of agriculture and the further development of animal industry, but the incompetent practitioner will not be tolerated by scientific agriculturists and breeders. It seems to me that it is unreasonable for a veterinarian located in a country district to expect to meet with a large degree of professional success if in addition to being in hearty sympathy with the agricultural extension movement he does not coöperate in full accord and harmony with the county agent in all his activities for the welfare of the community.

It is indeed a great privilege I have today in being permitted to address my colleagues of the American Veterinary Medical Association on a subject of such paramount importance to humanity as the improvement of animal husbandry, and the production of such essentials as human food and clothing. Never in the history of man has there been such a momentous responsibility upon the veterinary profession as there is at the present moment, a responsibility which, even if we would, can not be escaped; and therefore it behooves us to consider some of the larger problems that confront us. This Association has a great constructive work ahead of it, which, by reason of the character and ideals of its membership, will undoubtedly be performed in the interest of agriculture, industry and commerce, and its direction and leadership I feel sure will be hailed with satisfaction by all who have a broad conception and a wide vision of the demands of the future.

One of the first essentials is for the A. V. M. A. to make certain that the average veterinarian himself has a deep appreciation as to the fundamental and far-reaching importance of the science to animal husbandry, human life, prosperity and happiness.

I am in favor of this Association taking steps for the enlightenment of the public mind as to the character and the indispensability

of veterinary science in economic and efficient agriculture and as to the extent to which the urban as well as the suburban population is dependent upon the veterinarian for the enjoyment of health and the pleasures of life. A greater value of livestock and a more intense agriculture will increase the demand for the services of the veterinarian at a better remuneration. We can not reasonably expect the public to support the advancement of the profession unless it has a comprehensive conception of the character and scope of its activities and the vital importance of such activities to organized society, prosperity and the conservation of human health and life. What proportion of the people in any large city realize how dependent they are upon the veterinarian for sound and wholesome food? The value of our science to man in the production and conservation of human food alone justifies a most generous support of the profession, and I take it that it is a part of our job, the job of the A. V. M. A., if you please, to see to it that the general public is no longer left in ignorance as to its vital work and high purpose.

The status of law, medicine, theology, engineering, and perhaps some of the other professions, seems to be pretty well established in the public mind, and it would be almost an insult to the intelligence of the ordinary citizen to undertake to explain to him the standing and importance of these respective professions; but when it comes to the veterinary profession, what conception has the public as to its vital and far-reaching importance concerning the prosperity and welfare of the people? Do they know how dependent they are upon veterinary science? Does the urban population know that the veterinarian, in a very real sense, is the guardian of its health? Does the banker realize that the veterinarian is not only safeguarding, but applying the principles of veterinary science to the advantage and upbuilding of one of the greatest industries—that of the animal industry—which is an important factor in the greater possibilities of the banking business? Does the average person of education and refinement realize the nobility of the veterinary profession, and that he could not continue to possess comfort, health and happiness in the degree that he enjoys them if it were not for the achievements of veterinary science? I fear that the answer to these and like interrogatives would be in the negative; so I feel that it is the imperative duty of the A. V. M. A. to see to it that the public mind is no longer left in ignorance of a profession of such fundamental and far-reaching importance as that of veterinary science.

Necessity for prevention, as well as for the treatment of diseases of animals, is tending to make veterinarians the constructive leaders

in all matters pertaining to the health of livestock, since the losses from disease constitute the main hindrance to animal industry and the increase in the value of cattle, sheep, swine and poultry, while the cost of meat and dairy products are emphasizing the importance of the conservation of livestock. Our profession faces a responsibility which must be fairly and squarely met, if progress commensurate with the value of the science to humanity is to be made. This responsibility can not be discharged merely by the treatment of animal diseases therapeutically, or by preventive medicine as ordinarily understood and practiced, nor by the adoption of sanitary measures, eradication work, quarantine, police control or any other measure or activity along the line of checking, suppressing, curing or exterminating disease. The larger work of the veterinarian in the future will not be the treatment of disease, or even the enforcement of preventive measures, in the ordinary acceptance of that term; but his best energies will be expended in coöperation with breeders and growers of livestock in the upbuilding of a larger and better animal husbandry and industry, perpetuating the fertility of the soil; his work will be developed and maintained in accord and harmony with physiological laws under favorable conditions of the health, transportation and management of the livestock industry, so conducted that diseases which now occasion the loss of tens of millions annually will not occur at all, much less be disseminated from flocks or herds for thousands of miles from State to State and from one nation to another through the facilities of modern transportation.

In order to be more specific, I am going to divide veterinarians into five groups or classes:

1. Research workers and teachers.
2. Practitioners—those who treat disease therapeutically, by serum therapy or otherwise.
3. Sanitarians and official veterinarians—those who prevent disease by sanitary measures and those who are engaged in eradication and control work.
4. Army men.
5. Animal engineers—those whose training in the basic sciences of biology, chemistry and knowledge of animal husbandry enables them to make application of their knowledge of plant and animal life to the improvement, development and maintenance of superior breeds, types and classes of domestic animals in harmony with the laws of physiology and health for specific purposes, such as the production of meat, milk, wool and work.

Better livestock, bred and reared with greater vitality and productiveness, capable of adapting themselves to climatic and feeding conditions, with a natural immunity and with an inherent resistance to infection and disease, should be the objective of the veterinarian; and it seems to me that herein lies the foundation upon which a more efficient and economical animal husbandry is to be projected.

The necessity and advantages of the services of the first four groups of veterinarians are to a great extent obvious and generally admitted, and therefore, for the purposes of the present discussion, I shall confine myself more particularly to the fundamental importance of the work of the fifth group in the upbuilding of an animal husbandry and industry that will obviate heavy losses and unwarranted expenses because of our tendency to deal with effect instead of with cause.

Owners realize the necessity of proper treatment and care of livestock in sickness; the public recognize the importance of the control and extermination of infectious, contagious and parasitic diseases. Prophylaxis, preventive medicine and sanitation seem to be uppermost in the scientific as well as in the lay mind; and right here perhaps the greatest responsibility confronts the veterinary profession, for if the physical laws of animal life were more closely studied and a more intelligent application made of them in the breeding, rearing, management and general operations of the animal industry, such a transformation could and would be brought about as would supersede much of the dealing with effect, which in reality is what is being done in our control and eradication work. The responsibility for leadership and direction in projecting this constructive undertaking rests upon the A. V. M. A. Where it has not already been done, veterinary instruction and research should be provided for in medical and agricultural colleges and experiment stations. Through county agents and local organizations, extension work in agriculture offers an excellent opportunity for veterinarians to co-operate more effectually with farmers for the advancement and development of agriculture in harmony with the physiological laws of plant and animal life.

While preventive medicine owes an incalculable debt to sanitary science, the latter has its limitations, for if neutralization and sterilization were carried to the extreme no plant or animal life could exist. The veterinarian, through the sciences of biology and chemistry, has opened an avenue which can not fail to lead to wonderful results concerning the laws governing all physical life. Indefensible is the indiscriminate destruction of bacteria and microörganic life,

because it has been found that certain varieties are the causative agents of certain specific diseases in man and beast.

Is a wholesale slaughter or sterilization of microörganic life necessary or justifiable? In so doing, may we not be interfering with the processes of life? Have we any more warrant in continuing to pursue such a course than our forebears would have been justified in exterminating all the beasts of the field because in their wild state some of them were dangerous to man? Does not the fact that certain bacteria that are pathogenic to certain species and under certain conditions are not so to other species and under other conditions suggest possibilities of regulation and control?

All plant and animal life, including bacteria and microörganisms, have a specific function to perform in nature's economy, and the rational and scientific thing to do is to increase our knowledge of the conditions of existence so that we may be able to regulate, control and utilize microörganic life for the benefit of mankind, as wild beasts have been transformed into domestic animals which now provide material for our food and clothing, thereby materially contributing to our prosperity, comfort and happiness.

The fact that bacteria are builders as well as destroyers in vegetable and animal substances, in organic and inorganic materials, either in the presence or absence of air, may make possible advancement of the greatest advantage to soil fertility and animal husbandry, thus demonstrating their beneficence. The veterinarian will ever be interested in progress along this line of investigation. Science has demonstrated that some of the varieties of bacteria regarded as harmful and dangerous may be so regulated and controlled as to perform nature's function without causing disease or death, and thus aid, instead of retarding, animal husbandry and industry and the production and conservation of a larger and better supply of human food.

If my conception and perspective are right the profession is going to be lifted to higher levels of service and achievement. The impending demands, however, require of our veterinary colleges an education and training of students that will more adequately and abundantly prepare them to undertake the work of animal engineers in this larger constructive work of the profession. The responsibility of leadership in the movement rests with this Association.

Experience has demonstrated that the whole course of secondary and higher education needs to be so reconstructed that its main ob-

ject shall be to impart the power to observe accurately, think clearly, interpret correctly and reason independently and logically. The development of the power of logical interpretation is even more important than the mere acquisition of known facts. The graduate whose head is simply a storehouse of facts may be better prepared to take a State board examination, but his real, practical, available knowledge is not to be compared with that of the fellow whose brain has acquired the precious faculty of correct observation and interpretation.

Obsolete systems and methods of teaching should be abandoned, and all unnecessary subjects eliminated from the curriculum, which must be so reconstructed that it will enable the student to acquire a more thorough knowledge of normal life and the conditions necessary for the development of a more perfect animal husbandry and industry. The introduction of pathogenesis to the veterinary student *before* he understands livestock in health is "putting the cart before the horse." A more thorough training in chemistry, biology and other basic sciences is essential. Research, investigation, experimentation, scientific exposition and demonstration are of fundamental importance, and should supersede philosophical reasoning and dogmatic instruction.

A period of pupilage with a successful practitioner prior to application for matriculation gives a prospective student an opportunity of seeing how a practice is conducted and of learning many practical things, and it has the further advantage of affording a ready means of keeping him from taking up veterinary medicine if it should happen that he does not possess the natural aptitude, or if he should conclude that he does not care for livestock and the practice of veterinary medicine. If a young man is not adapted for the profession, he should be stopped at time of matriculation, or soon thereafter, and not allowed to pursue a course of education only to be rejected by an examining board or to make a failure of his life work, when if he had prepared himself for the profession or occupation that he was suited for he undoubtedly would make a decided success.

There was a time when a pupilage was considered all that was necessary, but such a preparation would hardly be considered adequate at the present time for one who would become a veterinarian in the broad sense of the term. I consider that this Association has taken an important step in advance in the establishment of a high-school or academic education as a prerequisite to matriculation, but

in addition natural aptitude for the profession is essential to a high degree of efficiency. Give me the boys raised on the farm who take an intelligent interest in cattle, sheep, swine, poultry, dogs and horses. I have been much interested in learning of the provision made in 1916 by Congress for aiding the States in establishing agricultural departments in rural public high schools, and that this instruction is imparted in the class-room and on the farm. The boy keeps records of feed, labor and other expenses on a bunch of fattening hogs, sows and pigs, beef cattle or dairy cattle. He forms habits of industry, regularity in the care of livestock, and of accuracy in keeping accounts; best of all, he forms *habits of close observation* of methods and results. In his four years of high school he forms permanent habits. A high-school graduate possessing such a training would make an ideal student of veterinary science.

We have arrived at a critical period in our educational and professional progress. A number of private institutions, as you are aware, have closed their doors, which I fear may have a tendency to hasten the multiplying of weak State schools, insufficiently supported, poorly equipped, with inexperienced teachers, which would mean a serious menace to the profession's advancement. We have enough veterinary colleges in America to take care of the whole situation. There are, however, two things much needed. One is more men, the other is better training for the fitting of these men to undertake the larger constructive problems now confronting the profession. The falling off in attendance in the veterinary colleges is remarkable, and if a change in this does not soon occur there will be a dearth of veterinarians in the land that will materially handicap all advancement. This Association might well give publicity relative to the splendid services the veterinary schools are rendering the country and the opportunities that are awaiting trained men.

I would readjust the course of instruction in the veterinary colleges so that students would spend part of their time during the junior year at least working in stockyards, on stock farms, on dairy farms, and other places connected with the business of the animal industry within easy reach of the college, where they would be engaged in caring for the several classes of livestock, and be brought in close touch with the practical operations of the various branches of the industry; the students to be paid current wages for the periods in which they work on these farms and other establishments. Probably they would be able to earn sufficient money to pay their expenses during these periods, so that the experience, if not actually

profitable, will at least not be a financial burden. This would tend to bring the college and its students into closer relations with veterinary work before they graduate. The need for such relations has been increasingly evident in the past few years. The object of such coördination is manifold: To stimulate interest in class-room work, to keep the teaching staff well informed of the needs of animal husbandry and industry and how to train veterinarians to meet them, to give the students more intimate knowledge of livestock and the problems which they have to meet after they graduate, and to give them an opportunity to discover how intricate and interesting these living animal machines are and to what extent scientific knowledge may be used in the animal industry. Another object of this plan would be to stimulate the interest of breeders and livestock men themselves in the adaptation to their special needs of education in veterinary science.

A plan of this kind has recently been inaugurated in the schools of engineering of some of the universities, and if it can be made efficient in making engineers it certainly ought to offer features of advantage in the training of veterinarians. This, or some similar plan, may have merit that will warrant this Association giving its support and encouragement.

THE NEED FOR EDUCATION

A boost for a higher standard of veterinary education has been received by the Bureau of Animal Industry from a New England correspondent, who writes as follows:

"GENTLEMEN: This is regards to Veterany pracace I wil cugest to yo how That death rat is Co large in anamels This large poplation the les it cst you & i that evry man that hasent Past exymation should Be mad to This will cave meney Anemels lives Meney animels die Because he dont No what perthology Means Cant make dignois Co the aninemels Dies

"Yours truly

"Did yo think of it Before rite"

It is evident that the writer had in mind the need for knowledge of pathology and diagnosis rather than for better education in English. His ingenuity in inventing four new ways to spell "animals" is praiseworthy.

THE COOPERATIVE TUBERCULOSIS CAMPAIGN IN PENNSYLVANIA¹

By T. E. MUNCE

State Veterinarian, Harrisburg, Pa.

I CONSIDER it an unusual honor to have the privilege of appearing before this assemblage, which is unique in character, as Director of the Bureau of Animal Industry of the great State of Pennsylvania. I am proud to be surrounded by such highly qualified, enthusiastic, earnest and loyal co-workers as comprise the Pennsylvania Bureau force. I am proud of the fact that Pennsylvania continues to have the whole-hearted support and complete co-operation of the approximately 1,000 practicing veterinarians of the State. Without the confidence and loyal support of the practicing veterinarians, who, as to ability, rank second to no other State in the Union, we as State or you as Federal officials could accomplish little.

I am proud to know that the breeders and others interested in agriculture and livestock whom we serve in our State appear to have confidence in the Department of Agriculture, from Secretary Rasmussen down the line, and that our citizens are as much concerned about animal diseases and are just as desirous as are we veterinarians to have healthy livestock.

I am proud to know that the United States Department of Agriculture, through the Federal Bureau of Animal Industry, has placed its strong arm around us and is not only assisting but is actually performing a large share of the work of eradicating tuberculosis in Pennsylvania. I am proud of the fact that we have representing the Federal Bureau of Animal Industry in Pennsylvania that four-square, tactful and liberal-minded man, Dr. P. E. Quinn. Pennsylvania is fortunate in having Dr. Quinn as its Federal representative, and we are of the opinion that the Federal Government is equally fortunate in having Quinn to so ably represent it. We are equally appreciative to the Federal officials for the excellent men assigned to assist Dr. Quinn.

Lastly, I am proud of the fact that the Federal officials selected the great Keystone State and this famous old city and institution of

¹ Presented at the Tuberculosis Eradication Conference, Philadelphia, Pa., October 11-13, 1920.

learning as the place for holding this conference. We are all deeply appreciative to them for so honoring Pennsylvania.

This conference, as the chairman has told us, has been called to discuss the work of eradicating tuberculosis and has invited a full, free and open discussion of every phase of the subject. I want to congratulate you, Mr. Chairman, for coming into our midst and displaying such a spirit of open-mindedness and throwing wide open, as it were, the gates of the conference, which makes all feel free to enter into the discussion and to exchange ideas. I hope that every one will take advantage of his invitation.

I note that the program provides for a number of ten-minute talks, which is an excellent thing, and I am sorry provision could not be made for five-minute talks by every one present. I hope, Mr. Chairman, that before this conference adjourns each person in attendance shall have thought aloud for five minutes. I make this suggestion knowing that every last one from Pennsylvania, be he affiliated with the State or Federal Bureau, general practitioner or breeder, has good ideas on the subject of tuberculosis and can tell us something worth while and which we ought to know if they only thought so and would do it.

Provision has been made on the program for reporting the progress of the tuberculosis eradication work in Pennsylvania, so that I will not go into that subject. I want to take advantage of this opportunity, however, to express publicly my appreciation of Dr. Bruner as Director of the Division of Tuberculosis Eradication, and all others connected with the Bureau, for the great work they are doing and the splendid results they are accomplishing in eradicating tuberculosis in Pennsylvania. Whatever credit is due in this respect belongs to these men.

The Federal Government and every State is naturally anxious to make as good a showing as possible in eradication work. There is, and very properly so, a more or less friendly rivalry between the States as to the results obtained. But I want to say at this time that Pennsylvania will in the future, as in the past, strive for quality in its work, rather than volume. We shall continue to employ the more conservative methods for tuberculin testing our cattle and leave it for those who prefer speed over permanency to use the new and least tried methods.

Since the work of eradicating tuberculosis under the officially accredited plan was inaugurated the tuberculin test seems to have occupied the center of the stage and we have been hearing little or

nothing about prevention. I am satisfied that not enough thought is being given the matter of prevention. More attention will have to be given this important phase of the subject, if we are to permanently eradicate tuberculosis. The tuberculin test and removal of diseased animals will not be sufficient. Pennsylvania is, as you will be told, paying close attention to sanitation as well as to the care of calves and maturing young stock which are to become the cows and bulls of tomorrow. Remember, that to have sound fruit it is necessary to spray the buds and blossoms.

We prefer to add but a few herds to the accredited list each year and keep them accredited rather than work for a big showing by testing hundreds of herds annually, issuing many accredited certificates and then have to remove them from the list on account of subsequent reactors as the result of faulty methods. Those who want to follow the policy that brings the most applause may do so, but we in Pennsylvania aim to work for the years to come, not alone for today.

With respect to the best means and methods for eradicating tuberculosis Pennsylvania enters this conference with an open mind. Our mind is made up on but one thing, and that is to do the job before us the very best we know, that is consistent with safety, but we are "dead set" against being influenced or carried away by visionary ideas and unproven theories.

This getting together of the various agencies concerned in the eradication work ought to sharpen our interest in the work. Each State is confronted with problems peculiarly its own, just as are the various sections of the United States and each will have to solve its problems in accordance with local conditions, yet keep well within the prescribed plan. If this getting together accomplishes nothing more than the creation of a closer and more sympathetic relationship between the Federal and State officials, practicing veterinarians and breeders, the time and money expended in coming here will have been well spent.

The Federal officials, from Dr. Mohler down, deserve great credit for what they are doing and should be given the fullest measure of support. If any of us, for selfish reasons, have been withholding even to the slightest degree any assistance or encouragement from Dr. Mohler and his associates, I trust that this getting together will bring about a better understanding and closer relationship.

I would like to submit for your attention and consideration the following suggestions:

1. That in view of the fact there are more herds under supervision than can be promptly taken care of by regularly employed agents of the Bureau, and owing to the increase in applications from owners for herd tests under the accredited plan, we are of the opinion that much of the work now being done by Federal and State agents could be carried on by practicing veterinarians, which would be, to use a popular phrase, to "speed up" the work, and we recommend that in the future more recognition be given the practicing veterinarians.

2. That there be a more uniform interpretation of the accredited plan throughout the United States.

3. That steps be taken to bring about a more uniform method for applying and interpreting the various tuberculin tests.

4. That in so far as is practicable, the form of contract or agreement between the owner and Bureaus be made more uniform.

5. That provision be made in the accredited plan whereby future amendments to the plan will automatically apply to existing contracts, thus doing away with the necessity of entering into new agreements or contracts with owners whose herds are already under supervision.

6. That more attention be given to preventive measures.

7. That full value up to a prescribed amount be paid for both native and interstate reactors which on autopsy show no visible lesions.

8. That the practice of slaughtering all reactors is robbing the country of many of our choicest animals, which should be preserved to perpetuate valuable blood lines, and a greater united effort should be made to establish more Bang herds on separate farms for keeping such animals.

9. That the accredited plan be amended as follows:

Section 4. Change "one reactor" to "two per cent" or some other percentage basis to be agreed upon.

Section 12. To specify the number of tests, if any, herds should be required to pass to become accredited after disposal of the reacting bull.

I assure you that we of Pennsylvania approach this conference in a spirit of cordiality and with the desire to be open-minded and fair. Moreover, we pledge fullest measure of support and coöperation to every organization, individual or interest engaged or concerned in tuberculosis eradication, to the end that this devastating disease may be speedily and permanently eliminated.

In closing I want to convey to you a message from our distinguished Secretary of Agriculture, Mr. Rasmussen, who, previous to hearing about this conference, arranged an important appointment. Secretary Rasmussen has asked me to say to you who hail from beyond our borders that he bids you a most cordial welcome to Pennsylvania and that he regrets exceedingly his inability to be with you in person. He hopes that your stay here will be both pleasant and profitable and adds that those who enter beneath the great keystone arch of Pennsylvania do not come too soon or stay too long.

The Health Department of Billings, Mont., is seeking a trained dairy inspector, and also a laboratory technician experienced in the bacteriological examination of milk and dairy products.

During the week ending December 5, 1920, there were 448 cases of foot-and-mouth disease reported in Denmark, making a total of 3815 cases during the present outbreak.

National Stockman and Farmer commenting on the tuberculosis-free county of Barron, Wisconsin, says "There are other counties which might profit, as this one will, by tackling the tuberculosis problem in time."

An American who has gone to South America to study the Short-horn situation writes in *Breeder's Gazette*, "Foot-and-mouth disease was in every herd that I saw. They take it down there as a matter of course. It is a big drawback, but it has been there for years, and they make the best of it. A big majority of infected cattle get well. It is hard on cows about to calve."

The American Dairy Cattle Co. is a nonprofit-sharing corporation incorporated under the laws of Illinois, to help the German people "to replenish their source of milk at the earliest possible date," and to help the German farmers to buy feedstuffs in the United States. The economic conditions of Germany demand that a cow must produce at least 7,250 pounds of milk and 250 of fat. Great care will be taken to secure cattle that will come up to this standard.
—*Farm Journal*.

ADMINISTRATION OF THE MEAT INSPECTION LAW BY THE BUREAU OF ANIMAL INDUSTRY DURING THE WAR¹

By W. N. NEIL

United States Bureau of Animal Industry, Chicago, Ill.

THE writer of necessity must confine himself to the activities at the Chicago station, in his consideration of the subject relating to the administration of the meat-inspection law and the conduct of the meat-inspection service during the period of the late war, because his work and the scope of his observations were limited to that station. However, it is presumed that the conditions at the Chicago station were very similar in every respect to all stations at which Federal meat inspection was maintained.

It was at once recognized that greater demands than ever before known were to be made upon the service and that there would be a withdrawal of men from the personnel of the meat-inspection force in order to supply men in other lines of duty, but it was apparent that in spite of these handicaps the meat-inspection service must be maintained at the highest degree of efficiency.

Early in the period of war the demands on our force for trained and experienced employees in the meat-inspection service were felt. Many of the employees, both veterinary inspectors and lay inspectors, prompted by a spirit of patriotism, volunteered for military service. That the service was being rapidly depleted of men essential to efficient meat inspection soon became an established fact, and for this reason the higher officials of the Department of Agriculture and of the Bureau of Animal Industry arranged to request exemption for employees called to military duty under the conscription act, in instances when it was felt that their services were essential to the meat-inspection service and when the individuals desired such exemption; but in no instance was an employee urged to request exemption from military duty against his own wishes.

In addition to the loss of employees because of having been called to the service of their country in other lines of patriotic duty, many of the meat-inspection employees left the Bureau service to accept employment in other lines of work paying more lucrative salaries.

Covering the period from April, 1917, to November, 1918, the labor turnover on the Chicago force amounted to 208 employees,

¹ Presented at the Fifty-seventh Annual Meeting of the American Veterinary Medical Association, Columbus, Ohio, August, 1920.

which was approximately 45 per cent of the working force. Necessarily these vacancies had to be filled by new employees, and such employees must be trained in the work. The vacancies were largely filled by employees appointed for a temporary period. Failing to find a sufficient number of competent men who were willing to accept temporary appointment, it was found necessary to recommend many women for appointment as assistants in meat inspection. By carefully selecting from the women applicants those best fitted for the work, it was found to be a very satisfactory means of renewing the depleted forces, and, with all due credit to these war workers, I must say they rendered, in most instances, very efficient service in many departments of the packing establishments.

Demands were made on the meat-inspection service by the Army and the Navy for inspectors especially efficient in the inspection of meat food products, who could be assigned to special and important work in inspection of meat at camps or barracks. These requests were met in all instances, and the employees so assigned deported themselves in a way to reflect credit upon the meat-inspection service.

Because of extended volume in the packing industry resulting from the needs of our own country and the allied countries, the duties of the meat-inspection employees were correspondingly increased, and they were required to perform more work and to remain on duty for longer hours, and this, for the most part, without additional compensation.

The principal function of the meat-inspection forces was to insure that no unsound, unwholesome or adulterated meats went forward from establishments operating under Federal inspection, and especially meats being prepared for Army and Navy uses, as it was thought possible that enemy agents might find employment in the larger establishments and secretly add dangerous substances to military supplies.

To preclude any opportunity for occurrences of this character, it was not only our practice to exercise closer vigilance over the various operations, but, in order to ascertain if any poisonous substances might have been added to the products, samples were collected from each lot of meat prepared for use by military forces, for laboratory analysis. In no instance was it found that any poisonous or other harmful substance had been placed in the meat.

It was also necessary that we coöperate in every way to permit the packing plants to operate to their greatest capacity, which meant that some departments operated both night and day. This emer-

gency was met, as were others, by requiring extra duty from the employees of the Bureau.

Generally speaking, the specifications under which meat was prepared as stipulated in the contracts for military supplies was not considered as a part of the duties of the employees of this Bureau, as this was looked after by special inspectors assigned to such work by the proper military organization. However, we in the meat inspection service felt it our duty and responsibility to make all inspections as required by the Bureau regulations.

Another very important duty assumed by the Meat Inspection Division was the conservation of meat food products, i. e., to direct from channels of inedible products and to direct into channels of edible products certain products which could properly, and which should rightfully, be saved for food purposes, but which up to that time had found their way into channels of inedible products. To carry out this project, without permitting abuses or wrong practices, required close supervision on the part of Bureau employees and added largely to their duties. However, they felt rewarded in that they were instrumental in increasing in a legitimate manner the supply of meat food products. The efforts put forth along this line were quite fruitful and resulted in the conservation of many thousands of pounds of edible products. It is, of course, needless to say that our efforts were appreciated by the management of the establishments, and they gave us their coöperation along these lines as well as in other lines of our official duties.

Following the signing of the armistice this service, as well as other lines of business, had to pass through the period of reconstruction by gradually filling the places of the temporary appointees. This was accomplished partly by reinstating the employees as they returned from military service and partly by filling places with employees who had successfully passed civil-service examination. The rehabilitation of the force was accomplished without serious interference with the service and without injustice being worked to anyone.

In a general summary I wish to state that the employees of the Bureau loyally met the increased demands made upon them. The high standard of efficiency of the meat-inspection service was maintained. Of all the millions of pounds of meat prepared for the use of the Army and the Navy, by establishments operating under Federal inspection, there was no case shown where unwholesome, unsound or adulterated products were furnished. For this achievement, under the great pressure of excessive demands and the anxiety

caused by added responsibilities placed upon them, the employees of the meat-inspection service feel justly proud, and I believe they are in no wise egotistic in feeling they performed their full patriotic duty.

Dr. G. W. Rosenberger, who has been an employe of the Bureau for the past fourteen years and since March 1, 1920, has been assigned to the position of Inspector in Charge of tick eradication in the State of Arkansas, resigned from the Bureau at the close of February 28, 1921, and has accepted a position with the State Department of Agriculture, Sacramento, Calif.

Col. W. G. Turner, Veterinary Corps, United States Army, who was recently detailed to the Surgeon General's Office, Washington, D. C., has now been ordered to Department Headquarters, Manila, Philippine Islands.

Dr. Gerald Rich and Dr. Clarence E. Bley, both graduates of the Veterinary Department of the University of Pennsylvania, have recently located at Augusta, Ga., to engage in general veterinary practice.

Dr. Charles W. Boyd, who formerly represented the Pennsylvania Bureau of Animal Industry, has resigned to enter private practice at Sewickley, Pa.

Dr. S. E. Young is a full-time veterinarian at the John A. Bell farms at Coraopolis, Pa.

Dr. John W. Adams, Professor of Surgery at the Veterinary School of the University of Pennsylvania, has resigned as Chairman of the University Council on Athletics. Dr. Adams gave unsparingly of his time and strength to this position and much real progress was made as a result of his judicial temperament, aided by his vast athletic experience, some of which was acquired as the captain and center of one of Penn's most famous football teams.

Dr. Claude M. McFarland, formerly located at Fort Worth, Texas, as vice-president of the Purity Serum Co., has moved to Kansas City, Mo., where he is associated with the Sihler Serum Co., as sales manager.

CLINICAL AND CASE REPORTS

VACCINATION FOR BLACKLEG IN SHEEP

By HOWARD WELCH, *Montana Experiment Station, Bozeman, Montana,* and HADLEIGH MARSH, *Livestock Sanitary Board Laboratories, Helena, Montana*

There was reported from the Montana Livestock Sanitary Board Laboratories in the JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION for December, 1919, an outbreak of blackleg in sheep, in which between 30 and 40 yearling bucks were lost out of a band of 270. The diagnosis was confirmed by laboratory examination, and the cultures have been carried for a year, during which time they have run true to form in every way. These cultures have been used in a number of experiments, and have been identical in all reactions with blackleg cultures recovered from cattle.

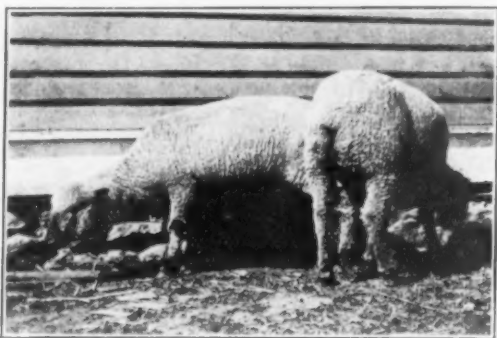
While blackleg is probably of rare occurrence in sheep, the fact that in this case a very considerable loss of purebred bucks was sustained due to blackleg brought up the question as to whether the blackleg vaccines in ordinary use for cattle would protect sheep. We find in the literature references to experimental immunization of sheep with various immunizing agents by Scheibel, Kitt, Foth, and Grassberger and Schattenfroh. Cave, in England, in 1905, vaccinated 318 sheep with vaccines of the attenuated virus type which were in use for cattle. He concluded that none of the vaccines available at that time were entirely satisfactory for sheep, as a considerable percentage of sheep died as a direct result of vaccination. We have not seen any record of tests on sheep using the immunizing agents employed for cattle in the United States at the present time. Therefore we decided to run a test of this kind in order to be able to advise as to the efficacy of blackleg vaccine for sheep, in case the disease should again appear. The immunizing agent used in this experiment was the natural aggressin.

Six yearling sheep, weighing approximately 100 pounds each, were obtained for the experiment. On August 14 four of these sheep were vaccinated with a commercial blackleg aggressin. The dose used was 3 c.c. After an interval of 20 days the four vaccinated sheep and the two controls were inoculated with a blackleg virus. The virus used was made by suspending 20 grams of finely ground dried muscle from a calf dead of blackleg in 100 c.c. of physiological

salt solution and filtering through a thin film of cotton. Five cubic centimeters of this material was injected into the muscle of the thigh of each sheep.

The original intention had been to use as virus the strain recovered from sheep, but we had not yet developed a standard method of preparing the virus from a culture, and therefore decided to use a muscle virus to make the test comparable with other published tests. As we had no muscle virus of the sheep strain on hand, we used the cattle strain. From the practical standpoint this might be of more value than a test with the sheep strain, since any infection occurring in sheep would probably be from a strain which had developed in cattle, due to the fact that blackleg is very prevalent in cattle and rare in sheep.

The inoculation with virus was made at 12:30 p. m., September 3. The next morning at 8:30 o'clock one of the controls was down.



Controls Twenty Hours After Inoculation

He could stand, but would not unless forced to it, and he was not eating. There was a marked edematous swelling of the inoculated leg. Control sheep No. 2 showed some swelling in the inoculated leg and was very lame, but quite active. The vaccinated sheep were all active and feeding normally, but were slightly lame, although there was no perceptible swelling.

At 6.00 p. m. control No. 1 was down and very sick. The inoculated leg was greatly enlarged by the edematous swelling, and the skin was discolored, with bloody serum exuding in places. At 8.20 p. m. this sheep was dead, and No. 2 was very sick.

At 8.30 a. m. September 5 the second control was still alive but unable to stand. The inoculated leg was very much enlarged and discolored. His temperature was 106.4 degrees. He was destroyed, and postmortem examination was made on both sheep. The char-

acteristic local lesions of blackleg were found in both sheep, practically the whole musculature of the thigh being dark and spongy.

The four vaccinated sheep appeared perfectly normal on the morning of the second day after inoculation. All lameness had disappeared.

The results of this experiment were very clear cut, as all four vaccinated sheep remained normal, while the two controls developed typical blackleg. The experiment shows that the natural aggressin in 3 c.c. doses will protect sheep against inoculation with a fatal dose of blackleg virus.

THE X-RAY AS DIAGNOSTIC AGENT IN THE HORSE

By H. MEADE HAMILTON, *Muncie, Ind.*

Patient: Denmore, bay pacing mare, 4 years old, weight 900 pounds.

History: Injured in a race, July 17, 1920; shipped from Ohio to Muncie, arriving July 24.

Symptoms: Severe lameness in left hind leg, swelling slight between fetlock and hoof. Great pain on pressure, slight crepitation, but no displacement.

Diagnosis: Fracture, but unable to determine exact nature of same. X-ray examination revealed (as per picture) a complete longitudinal fracture of the os suffraginus. (X-rayed by Dr. B. R. Kirklin.)

Treatment: Absolute rest. Secure bandaging leg from foot to hock, but not immobilizing same, as I was afraid if leg was made rigid ankylosis might occur; therefore enough support was given by snug bandages to retain parts in place. The animal was very careful and took excellent care of injured leg; could lie down and get up without touching foot to ground, thereby aiding repair to a great extent.



Fracture of Os Suffraginus as shown by X-Ray

In October the mare was taken to the country and turned out, and on December 13 was absolutely sound as far as lameness was concerned and with slight enlargement of the region involved, and slight deviation of foot, from ankle down, outward from natural contour. No visible involvement of the movements of either joint. This mare will be trained and raced the coming season.

INTERESTING CASE OF PANCREATIC GLYCOSURIA

By G. E. JORGENSEN

Assistant State Veterinarian, Clermont, Iowa

The patient, a four-year-old black mare, was brought to my office May 14 for treatment. The history revealed that it had been ill with influenza four months prior to the present affliction, from which it had recovered after running an atypical course. The present illness consisted of marked progressive emaciation, together with a transitory lameness in all four legs and an ulcer the size of a silver dollar on the left half of the mammary gland. The history and present symptoms made it certain to me that the animal was suffering from some obscure disease (I rather suspected anemia of leucemia), hence I requested that the animal be left with me for further observation and thorough clinical and laboratory examination, which accordingly the owner consented to. The results of this examination follows:

Clinical—Temperature 99.5; respiration 19; pulse 51 and irregular (tachycardia arrhythmia). Peristalsis normal. Auscultation of the lungs negative. Auscultation of the heart revealed a marked systolic murmur, and as the animal was poorly nourished, percussion showed considerable enlargement of the heart.

Laboratory—Smears from nose showed the usual bacterial flora. Smears from the ulcer gave similar results. Nothing positively pathogenic. Mallein, ophthalmic, negative. Urine, albumen negative. Smears showed a few epithelial cells but no casts or blood cells. Test for albumoses positive. Specific gravity 1056. Test for sugar positive. No quantitative test attempted. Dragendorff's test showed bilirubin present. Blood—Erythrocytes, 6,400,000; marked poikilocytosis and macrocytosis; lipemia present; leucocytes, 14,000, with preponderance of polymorphonuclear cells.

Conclusion.—The history, the positive test for albumoses and the bile pigments in the urine would lead to the supposition that a metastatic abscess was or had been present in the liver. The presence of

sugar in the urine and fat in the blood would point to diabetes mellitus. That was my prognosis, and inasmuch as it would be practically impossible to put a case on a sugar-free diet, the treatment was discouraged and a fatal prognosis given. I asked for the opportunity of making an autopsy. The owner was unwilling to kill the animal, but promised to advise me as soon as it died. This it did on July 23, and the autopsy was made the same day and revealed the following: Lungs, chronic bronchitis and somewhat congested. The balance of the respiratory tract was apparently normal. The heart was enlarged and showed lesions of an old endocarditis involving the valves in particular. The spleen contained a well-capsulated abscess, the contents of which were inspissated and partially absorbed. The stomach and intestines were normal with the exception of a marked congestion and ulceration of the diverticulum duodeni involving in particular the hepatic duct. The liver showed a series of interesting pathology. The entire right lobe had undergone an atrophic sclerosis and contained the remnants of a large abscess almost completely absorbed. The middle lobe was congested, while the left lobe appeared normal. The entire hepatic duct was congested and contained two small ulcers from which streptococci and colon bacilli were isolated. The hepatic vessels, especially the hepatic artery and the portal vein, appeared to be dilated. The pancreas had undergone an extensive degenerative process of a colloidal variety and appeared to have been the seat of several minute abscesses. The duct was somewhat thickened by congestion. The kidneys both showed lesions of a slight interstitial nephritis. The balance of the organs including the brain and cord, outside of showing evidence of a long wasting illness, were normal.

Conclusions of my diagnosis made antemortem remained unchanged, except as it concerned the cause of the glycosuria, which the autopsy showed be of a pancreatic variety due to degenerative processes brought on by an atypical infection in the form of influenza.

TECHNIQUE FOR TREATMENT OF ATRESIA OF TEATS OF COWS

By J. P. TURNER, *Washington, D. C.*

THE following technique, while not original, has been used quite successfully by the writer for several years.

It is especially useful in those cases involving the end of the teat; as the stricture approaches the base of the teat, the prognosis is not so good, but in all cases more depends on the cleanliness of the

operation and the subsequent care of the teat than any other feature.

The cow is secured, usually in an end stanchion, in order to limit movement. The tail is tied to a surcingle and the udder and teats are thoroughly scrubbed with soap and warm water and the teat needing the operation is soaked in a cup of gasoline or a small amount of ether.

An antikicking strap is applied securely above both hocks and a nose lead applied. Nervous cows can be further secured by using a two-inch by four-inch plank as a squeeze. The operator's hands should be absolutely clean and just prior to operation the teat should be immersed in a small cup of 1-1000 bichloride of mercury solution and then iodine is applied to the end of the teat. The modern teat slitter (not the old, dirty, sliding type) is pushed into the teat opening by securely holding the teat with one hand and making two incisions at right angles if the end of the teat is nearly closed. In some cases the "Hug" teat reamer is used, especially if the atresia is caused by a wart-like growth.

The teat is immersed in a cup of 1-1000 bichloride of mercury solution after the atresia is opened. The teat is thoroughly dried with absorbent cotton, and electrician's tape (Grimshaw's) is wound around it firmly but not tight enough to twist the teat. After the teat has been spiralled with two thicknesses of the tape, extending one inch from the apex to the base of the teat, a piece of electrician's tape about five inches long is doubled and a hole cut about half an inch from the end. This folded piece is now applied to the taped teat perpendicularly and is firmly bandaged by two or three rolls of the electrician's tape, allowing the end having the perforation to project nearly to the end of the teat.

A ring-end metal teat plug to which has been attached a piece of tape is now removed from a salt-mouth bottle containing four ounces of colored commercial alcohol and introduced into the teat, being tied to the projecting piece of electrician's tape.

The cow is released, the tail being kept tied to a surcingle for several days. Clean bedding is very necessary.

Two quarts of 1-1000 bichloride of mercury solution is left with the attendant with directions to pour a small quantity into a clean cup and soak the teat in it prior to removing the teat plug and subsequent to milking and replacing the teat plug, which should be kept in the bottle of alcohol while the cow is being milked. The attendant is given instructions advising milking the three sound teats, then applying the antikicking strap and washing the udder if dirty and always his hands prior to handling the teat.

It is believed that the use of the bichloride solution for soaking the teat and the use of the salt-mouth bottle of commercial alcohol in which to insert the teat plug, instead of laying it on a dirty ledge of the barn, greatly assists in preventing infection.

The attendant is advised to milk the cow first and not to touch the teat plug with his hands save at the ringed end. The use of the teat plug is indicated for a week to ten days.

INTUSSUSCEPTION OF THE POSTERIOR PART OF THE SMALL INTESTINES OF A BUFF PLYMOUTH ROCK CHICK

By B. F. KAUPP, *West Raleigh, N. C.*

Intussusception or invagination of the bowel has frequently been observed and reported in cattle and in horses and occasionally in



Invagination of Bowel of Four-Weeks Old Buff Plymouth Rock Chick. (1) Juncture of Small and Large Intestines; (2) Point of Invagination; (3) Anus

other animals. Intussusception of the intestines of the sheep was reported by the author in the JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION, January, 1917. This condition in mammals is said to be accompanied by symptoms of colic, especially

in the bovine and equine species. Irregular and excessive peristalsis, according to Dollar, may cause several feet of the small intestine to become intussuscepted.

The subject of the present report is in a four-weeks-old Buff Plymouth Rock chick. The first symptom noticed was a slight diarrhea, later a fleshlike substance protruding through the anal opening. There were no symptoms analogous to colic in the horse or ox; in fact, chickens do not manifest such symptoms. In a few days the chick died.

At autopsy all organs appeared normal except at a distance of about $1\frac{1}{2}$ inches in front of the juncture of the small and large intestines. In the illustration 1 shows the junction of the small and large intestines, at which point may be seen the right and left ceca given off. At 2 will be noted the point of commencement of invagination, the small intestines completely telescoping until a portion of the bowel protruded through the anal opening. This is a distance of about $3\frac{1}{2}$ inches from the point where the invagination began. The upper wall of the intestines are laid open so that the invaginated bowel is in plain view.

MILK FEVER¹

By J. B. KNAPP, Cortland, N. Y.

IN presenting this paper to the members of the Central New York Veterinary Medical Association I do not claim to have discovered anything new, nor to have done more than any practitioner would have done. The case I am about to describe was somewhat different from any that I had ever encountered before, and I thought it might at least be interesting to some of you.

Some little time ago I received a telephone call to come quite a distance from home—something like 18 miles—to see a sick cow. I responded to the call and reached the place about 10 a. m. The patient was a large grade Holstein cow, about 9 or 10 years of age. Upon inquiring from the owner I found the cow had calved just seven days previous to my visit and up to the evening before had to all appearances been perfectly well.

The cow lay on a dirty cement floor with no bedding, was unable to arise, and continually pounded her head on the cement floor. Her temperature was somewhat below normal—about 98.8° —her pulse somewhere, as near as I could get it, about 65.

¹ Presented at the meeting of the Central New York Veterinary Medical Association, Syracuse, November 18, 1920.

Asked as to her chances for recovery, I gave a guarded prognosis. I told the owner that the symptoms indicated milk fever, but that the length of time that had elapsed since she calved rendered my diagnosis uncertain.

After watching the patient for a short time and not knowing what else to do, I proceeded to inflate her udder, after which I gave her $\frac{1}{2}$ grain of strychnine hypodermically. I then packed straw around and under her as best I could and made her as comfortable as possible.

In a short time she quieted down and I began to think my diagnosis was correct. It was, however, about four hours before there was any noticeable improvement, and the cow did not regain her feet until the following day, after which she made an uneventful recovery.

In reviewing the history of this case there were some things that to me appeared quite unusual. I never before have had a case of milk fever that occurred seven days after calving. I can, I think, recall having two cases previous to parturition, one the day before and the other three or four days before.

The slowness with which the animal recovered was also somewhat strange to me. In my experience in such cases, from three to five hours, and many times much less, will find the animal on her feet.

I would not like to close this paper without making mention of the marked improvement that has taken place in the treatment of milk fever in the last 18 years. When I graduated from Cornell in 1902 I wrote my thesis on milk fever, or, more scientifically speaking, parturient paresis. A large per cent of our patients at that time died and the prognosis was always bad. Now, if one can reach the patient before she dies there is nothing more simple to treat than milk fever, and the disease which has killed millions and millions of dollars worth of cattle in this country is no longer to be dreaded by the veterinarian.

UNUSUAL LOCATION OF ŒSTRUS EQUI

By A. E. CAMERON,

*Pathologist, Lethbridge Laboratory of the Health of Animals
Branch, Canada*

IN carrying out a postmortem, December 12, 1920, on a horse which had been artificially infected with dourine, two bots were found attached to the external surface of the stomach wall, near the

point of entrance of the esophagus. The area where these two larvæ were located showed inflammation, over about two inches square, with formation of fibrous tissue. They were firmly adhered and there was no break in the stomach wall.

Internally about 100 bots were attached around the esophageal opening; the food contents were entirely liquid. A considerable difference in the development of the larvæ in the stomach was noticed, and numerous eggs remained on the forelegs, in the usual location.

There would appear to be no doubt that these two parasites had been located outside the stomach wall some time, as the horse was killed in a moribund condition and the postmortem was proceeded with at once.

TO DENVER BY MOTOR

Dr. W. E. Muldoon, Resident Secretary for Kansas, reports that he is doing everything possible to stimulate interest in the A. V. M. A. in that State and hopes to have a goodly number of applicants lined up before the next meeting. He further states that at the annual meeting of the Kansas Veterinary Medical Association held at Salina, Jan. 4 and 5, a committee was appointed consisting of himself, H. M. Graefe of Topeka, and A. H. Gish of El Dorado, to arrange for the Kansas veterinarians to make the trip to Denver by auto. It is their idea to leave Kansas City and go through on schedule time over a definite well-known trail picking up the various members at regular stops. He writes: "We intend to show the world that the Kansas veterinarians, like everything else from this State, are a real live bunch."

It is gratifying to note that the better-sires campaign * * * is meeting with marked success. * * * A movement of this kind, once it is started and the sires show the effect they have upon their offspring, is bound to grow, even of its own accord. But the Government will keep up the work and there is no telling how many additional thousands of men will switch from scrub and grade to purebred sires next year.—*Iowa Homestead.*

ABSTRACTS

AN EXPERIMENTAL STUDY OF ECHINACEA THERAPY. James F. Couch and Leigh T. Giltner. Jour. Agl. Res., vol. 20 (1920), no 1, p. 63.

Various preparations of echinacea—namely, the “Specific Medicine Echinacea,” the fluid extract echinacea, and the “Subculoyd Inula and Echinacea”—were studied as remedies in several types of infectious and allied diseases, both acute and chronic, in guinea-pigs. In both tetanus and botulism produced by the administration of bacterial toxin the course of the disease was not modified by the echinacea. In septicemia produced by injection of a culture of *Bacillus bovisepiticus* and in anthrax produced by injection of *B. anthracis* the results indicated that echinacea had no influence. In poisoning by the venom of the rattlesnake produced by injection of a solution of the dry venom the echinacea preparations were without curative effect. In the chronic diseases, tuberculosis produced by injection of a human strain of the bacillus and trypanosomiasis produced by injection of *Trypanosoma equiperdum*, the remedy was administered over an extended period of time without apparently influencing the course of these diseases. Definite evidence of organic effects from the echinacea itself was not obtained.

SIMULTANEOUS VACCINATION OF SHEEP AGAINST SHEEP POX (VARIOLA OVINA) AND ANTHRAX. Charles Dubois. Revue Générale de Médecine Vétérinaire, vol. xxix (1920), p. 483.

Sheep were obtained from an establishment where neither pox nor anthrax had ever occurred and where vaccination against these diseases had not been practiced. The two year old animals used were susceptible to both diseases. The anthrax vaccines and sensitized pox vaccine were obtained from the Pasteur Institute of Algiers and Paris.

Sheep were vaccinated on the same day with pox vaccine and the first anthrax vaccine by subcutaneous injection; the second anthrax vaccination was made 11 days after the first.

The animals were shown to be immune to both diseases by suitable inoculation with pox virus and anthrax culture; controls succumbed. The serums of the simultaneously vaccinated animals showed antibodies to both diseases by the complement fixation test. A sheep, having the pox in “confluent, grave” form was allowed to

run free with the experimental animals for several weeks, without any of the vaccinated animals contracting the disease.

W. N. BERG.

MEAT POISONING IN HOLLAND. K. Hoefnagel. *Zeitschr. f. Fleisch u. Milchhyg.* (1920), XXX, No. 21, p. 282.

Three outbreaks of meat poisoning are cited in which rather large numbers of people were affected. In the first instance seventy people living in Schagen were made ill. The clinical picture was that of a severe gastroenteritis with persistent diarrhea which lasted three or four days. All the patients got well after eight to fourteen days. The source of the infection was traced to flesh from an emergency slaughtered horse. The animal was reported by the owner as being weak and debilitated; no mention was made of diarrhea symptoms. At autopsy no lesions aside from some adhesions between the liver and colon were detected. Bacteriologic examination of some of the meat which had been seized after the people were taken sick revealed the presence of paratyphoid bacilli.

The second epidemic occurred in Laren and many people became sick, the symptoms being like those of the Schagen outbreak. The meat causing the illness was obtained from a cow reported to have been an emergency slaughter case. Laboratory examination of the meat determined the presence of paratyphoid organisms.

The third outbreak occurred in a family of seven people who had eaten beef alleged to have originated from a dead animal. There were symptoms of vomiting and diarrhea. In the beef as well as in the stools of the patients paratyphoid bacilli were found.

L. T. GILTNER.

SOME CASES OF MEAT POISONING. R. Lorenz. *Ibidem* (1920), XXX, No. 21, p. 283.

In Stuhm sixty persons became ill after eating meat and sausage derived from a sick cow. The animal had made an easy delivery and the next day passed the afterbirth. According to the statement of the butcher the uterus contained a large quantity of foul smelling fluid. The meat inspector who was called after the animal had been slaughtered found nothing but a slight inflammation of the uterus and passed the carcass for food. Only persons who ate the liver and blood sausage and the flesh in an uncooked condition became sick. The symptoms set in within twelve hours

after eating the flesh and sausage. They consisted in profuse diarrhea and marked debility. No disturbance of vision was observed. Eating the cooked or roasted meat of the cow caused no illness.

L. T. GILTNER.

ACETONURIA IN DOMESTICATED ANIMALS (Horse, Cattle, Dog).

Gustav Sinn. *Archiv für Wissenschaftliche und Praktische Tierheilkunde*. Vol. 42, 1916, pp. 322-367.

The author discusses in detail the following: (A) Detection of acetone in urine qualitatively and quantitatively by several methods; (B) detection of diacetic acid (aceto-acetic acid) in urine; (C) qualitative and quantitative estimation of oxybutyric acid in urine; (D) the clinical significance of acetone bodies in the urine. Figures are summarized in 5 tables showing the author's results with normal and pathological urines. Conclusions are: 1. Acetone is regularly found in normal urine of horses and cattle. 2. The amount is 0.38-3.86 mgs. per liter of horse urine; 0.2-2.4 mgs. per liter of cattle urine. There are at present no dependable methods for acetone estimation in dog's urine. Rowold's results for acetone in dog's urine are questionable. The urine of tuberculous cattle contains no increased amount of acetone. During fever, horse urine contains increased acetone, up to 17 mgs. per liter.

W. N. BERG.

THIRTY-FOUR CASES OF ANTHRAX IN NEW YORK CITY. S. Dana Hubbard and William Jacobson. *Monthly Bulletin, N. Y. C. Health Department*, November, 1920, pp. 249-266.

This bulletin is practically devoted to a discussion of 34 cases of human anthrax which occurred in New York City during the two years, 1919-1920. The Sanitary Code requires that all cases of anthrax be reported to the Department of Health within 24 hours. As soon as the cases described were reported they were visited personally by a member of the department. The authors point out the increased prevalence of anthrax and give details of each case with a summarizing table and several statistical tables (the small number of total cases renders deductions therefrom uncertain). The cases occurred in persons from 14 to 79 years of age; all but two were males; 11 died; the fatal cases terminating usually within eight days; parts affected were in order; face, neck, both face and neck, and wrist and hands. Bacteriological findings for anthrax were positive in 31 cases, negative in two, and not determined in another. The clinical findings are summarized. The study tends to show that

those receiving anti-anthrax serum (20 out of 26) recovered as against recovery of only three out of eight who did not or in whom the method of treatment was not recorded. Occupational causes were as follows: Shaving (using new shaving brushes) 17 cases; manufacture of brushes, five cases; trucking (exposure to hides and skins), eight cases; millinery (hair cloth and hair braid), one case; house cleaning (with hair brush), one case; and unknown, two cases.

Dr. H. A. Burton has purchased the hospital and equipment of Dr. H. F. Stovall of Arcadia, Louisiana, and has moved from Ruston to begin practice at Arcadia.

Dr. L. A. McGibeny, a graduate of the Grand Rapids Veterinary College in 1918, has sold his practice at Evart, Michigan, to Dr. B. Brunink, his classmate at college. Dr. McGibeny will return to Belmont, New York.

Secretary Mayo spent several days in Connecticut during January, where he delivered one address before the Connecticut State Dairy-men's Association and another on the "Farm as a Home" before the Connecticut Agricultural Society.

The production of anti-hog-cholera serum and hog-cholera virus during 1920 under United States Government license was as follows: Ordinary serum, 350,395,925 c.c.; clear serum, 39,832,984 c.c.; total serum, 390,228,909 c.c.; ordinary virus, 21,993,035 c.c.; clear virus, 450,343 c.c.; total "simultaneous" virus, 22,443,378; hyper-immunizing virus, 87,338,709 c.c.

"Argentina, which has had trouble with foot-and-mouth disease for some time, is apparently making an effort to clean up. Importations of livestock from Spain and Germany, in both of which countries the disease exists, have been forbidden."—*Orange Judd Farmer*.

The Literary Digest calls attention to the following sentence which occurs in a special article in *The Saturday Evening Post* and which carries a meaning that was probably not intended by the author: "His name is Andrews, and he is a trapper of predatory animals in the Federal employ."

ARMY VETERINARY SERVICE

To the Editor:

Please let me say amen to the comments of M. C. H. upon Dr. Woods' contribution, appearing in the January number of the JOURNAL. It is well known that some of the best veterinarians in the United States were found "incompetent" (?) overseas and sent home; others equally good went over as 2d lieutenants, served twenty months or more, returned and were discharged as 2d lieutenants, while men of no renown were made majors. All of which proves nothing for or against the profession. A Mr. Baynes is now touring the country giving illustrated lectures on "Animals in War" and he tells his audience that the American Army Veterinary Corps over there, was fifty years behind the times.

If that be true, it is also true that at no time has a veterinarian been at the head of the Corps. I most heartily agree that we will never really know if our wings are strong enough to hold us up and carry us forward abreast of the times and to function like other military organizations, unless we strike boldly out with such wings as we have. Strange, indeed, if in all this great country there can not be found the proper veterinary timber to head and administer our Army Veterinary Corps.

FREDERIC M. PERRY.

Major-General S. J. Blenkinsop, K. C. B., Director-General of the Army Veterinary Service for Great Britain, in a recent letter requests that his thanks and appreciation be expressed to the President of the American Veterinary Medical Association and all the members for the marked distinction that they have placed upon him by electing him to honorary membership.

Major-General Sir Frederick Smith, K. C. M. G., C. B., formerly Director-General of the British Army Veterinary service, has also written and expresses a desire to thank the Association and the officers for their kindness in electing him an honorary member of the American Veterinary Medical Association.

Honorary Member Col. J. J. Aitkin writes from Bombay, India, as follows:

"I cannot express how very greatly I appreciate the honor your Association has done me, but trust you will convey to them this, my very inadequate message of thanks."

ASSOCIATION NEWS

VETERINARY MEDICAL ASSOCIATION OF N. Y. CITY

The regular monthly meeting of the association was held in the lecture room of Carnegie Laboratory, New York City, on Wednesday evening, December 1, 1920.

President MacKellar presided. The minutes of the November meeting were read and approved.

Dr. Ray W. Gannett, Brooklyn, New York, read an interesting and original paper on "The Value of Tenotomy of the Perforans Tendon in Cases of Vaginitis of the Hock and Navicular Bursitis."

Dr. Gannett said he wished to give Dr. Bemis the credit of being the originator of this operation. It consists in making a longitudinal incision through the skin and sheath of the tendon on the inner face of the hock, for a distance varying from two to four inches, according to conditions. Considerable purulent synovia usually escapes. The synovial cavity is cleaned with antiseptics. The fore finger of the left hand is passed into the wound and under the tendon from its anterior surface. In other words, the finger is placed between the bones of the hock joint and the tendon. The probe pointed bistoury is then passed beneath the tendon, being guided by the finger, and the tendon is carefully severed. The wound may be somewhat enlarged to insure drainage. The sheath cavity is carefully disinfected and the wound packed with absorbent cotton, saturated with Dakin's solution and bandaged. The after care consists in the usual treatment for open wounds. The horse as a rule is fit to work in about four weeks after the operation.

The doctor said of seven cases operated on, six have made serviceable recoveries. During last winter, Drs. Risley and Gannett operated on three apparently hopeless cases of open and infected navicular bursa, due to deep punctured nail wounds. Drainage and antiseptic treatment of the foot were continued. In addition tenotomy of the flexor pedis perforans tendon was performed in each horse. Two of the cases continued to grow worse and were destroyed. The third case made a remarkable recovery. The temperature dropped from 105° to 102°, excessive pain and lameness ceased at once and appetite improved. In four weeks the horse was returned to work slightly lame on a trot.

This paper brought out a good discussion by Drs. Berns, Clayton, Blair and MacKellar.

This being the annual meeting the reports of all committees and election of officers were in order. The accounts of the Secretary and Treasurer having been audited by the Auditing Committee, he reported a balance in the treasury of \$122.97. This report was regularly accepted. The election of officers for the ensuing year then took place and resulted as follows:

Dr. Robt. S. MacKellar was unanimously reelected President.

Dr. Edward A. Durner was unanimously elected Vice President.

Dr. J. E. Crawford was reelected Secretary-Treasurer.

From those nominated as Censors, the following were elected: C. E. Clayton, Chairman; Reid Blair, Geo. H. Berns, Wm. H. Hoskins, Bruce Blair.

Dr. Chas E. Clayton reported the case of a fracture of the os pedis. The show horse, "The Wasp," was being driven from the stable to the show ring at the last Brockton Show, when he stepped on an unexploded bomb, which went off, causing a very severe lameness. Dr. Clayton was sent for but the horse died during the night before he arrived. The Doctor removed the foot and on dissection he found the os pedis fractured into three parts.

The application for membership of Louis J. Camuti, New York City, was read by the Secretary. Dr. Gannett said he did not believe the applicant had passed the State Board. It was regularly moved, seconded and carried that the application be laid on the table. No further business appearing the meeting adjourned.

J. ELLIOTT CRAWFORD, *Secretary*.

GEORGIA VETERINARY MEDICAL ASSOCIATION

On December 8, our State meeting convened at the Veterinary Division of the Georgia State College of Agriculture. None of the officers of the association being present, Dr. William M. Burson was selected as presiding officer for the sessions and Dr. A. G. G. Richardson was requested to act as Secretary.

Dr. Burson introduced President Andrew M. Soule of the State College, whose address of welcome was given in a characteristically able and hearty manner. President Soule spoke of the friendly feeling and attitude which he had always maintained for the veterinary profession and of the many efforts he had made to better veterinary education in Georgia. He also gave us very valuable information in regard to the present world situation and communicated to us all an optimistic feeling in regard to the outlook for the future. His address was warmly received.

Dr. Richardson added a few words of welcome in the name of the faculty of the Veterinary Division. Owing to the absence of Dr. J. M. Sutton the response to the addresses of welcome was made in a very pleasing manner by Dr. W. B. Carlisle of Montezuma, Georgia.

A very able paper on a practitioner's experience in treating animals suffering from attacks of "southern canine plague" was read by Dr. Carlisle. The paper created a good deal of interesting discussion.

The meeting then moved to the barn, where, under the direction of Professor M. P. Jarnigan, many hogs and dairy cows were judged. The results showed a marked diversity of opinion among the visiting veterinarians as to the proper placing of the animals and brought out instructive explanations as to the proper placing of the animals in accordance with the teachings of animal husbandry.

First on the program on the second day was the "Question Box." Several questions of interest and importance were presented. Answers were made by Drs. Bahnsen, Richardson, Carlisle and Burson. Dr. R. O. Suddath presented a paper on "Experience in Cow Practice and Other Effervescences." This paper was rich in every-day practical advice, interspersed with bubbling "effervescences" and the members were highly and pleasingly entertained thereby. Dr. W. A. Downs presented an instructive paper entitled "Breaks Following Serum Treatment." The discussion brought out by this paper was the most extensive one of the meeting. Drs. Persells, Titus, Carlisle, Jago, Heyde, Bahnsen, Richardson, Coffman, Burkhardt, Handly, Trumbo and Wright participated in the discussion.

On motion of Dr. Bahnsen the association requested Dr. Richardson to enlarge upon an idea he presented in this discussion and to prepare a paper thereon for presentation at the meeting of the Southeastern Veterinary Medical Association at Spartanburg, South Carolina, January, 1921.

Dr. W. M. MacKellar presented a paper on "Conditions Under Which Herds Can Be Tuberculosis-Free Accredited in Georgia." Dr. MacKellar's paper was extremely well prepared and full of instructive information. It was accorded a hearty appreciation by the members. Dr. Richardson presented a brief paper on "The Status of Veterinary Education." The paper was well received and Drs. Bahnsen, MacKellar and Wright participated in the discussion which followed. The meeting adjourned to the dining hall in

the main building, where a bountiful feast was spread for us through courtesy and kindness of the Board of Trustees and the Faculty of the Georgia State College of Agriculture. The concentrated attention given to this item of the meeting fully attested the appreciation on the part of the members of the bounty and quality of the feast.

Thirteen new members were elected to membership in the association, viz.: G. A. H. Edmiston, A. J. Titus, N. J. Ayers, J. H. Moore, A. G. G. Richardson, W. E. Stroud, M. King, H. E. Englehardt, J. I. Hendley, R. J. Heyde, E. L. Jarvis, H. V. Persells and P. T. Connolly. The names of Drs. J. W. Salter and A. G. G. Richardson were presented to the association for recommendation to the Governor for appointment to the vacancy existing in the State Board of Veterinary Examiners. As the result of the votes cast Dr. Richardson was the selection of the association.

Nominations for President, Drs. William M. Burson and B. E. Carlisle; Vice-President, Dr. A. L. Hirleman; Secretary-Treasurer, Dr. P. F. Bahnsen; in the ensuing balloting Dr. B. E. Carlisle was elected President.

On motion, the Acting Secretary was instructed to cast the unanimous vote of the association for Dr. A. L. Hirleman for Vice-President and for Dr. P. F. Bahnsen for Secretary-Treasurer. This being done, Drs. Hirleman and Bahnsen were declared duly elected for 1921.

Next on the program was the selection of the next meeting place. Athens and Macon were both suggested, and on a standing vote of the members present, Macon was selected. The meeting will be called between the dates of September 17 and 30, 1921.

The incoming Secretary-Treasurer was instructed to express in writing the appreciation of and the thanks for the dinner given the association.

The incoming Secretary-Treasurer was instructed to spread upon the minutes of the association and forward copy to Mrs. C. A. Downey, Waycross, Georgia, resolutions of respect and sympathy in her bereavement. A. G. G. RICHARDSON, *Acting Secretary*.

NEBRASKA VETERINARY MEDICAL ASSOCIATION

Our annual meeting was held in Grand Island, Nebraska, December 15 and 16, 1920, and was in many respects the most successful in the history of this association, there being on an average about

two hundred in attendance during both days. A worth-while deviation from the regular routine was in the form of a banquet the evening of the first day, the program being of general interest to livestock breeders in particular. Many representative breeders from different parts of the State were present and some took an active part in the program. In addition to the speaking, a short motion picture show was put on. Two reels, one on hog cholera and the proper manner of vaccinating and the other on tuberculosis in the dairy herd, were received with a great deal of interest and appreciation. Special songs were sung, in which nearly everyone present took part. The evening program was concluded with a dance which lasted from about ten-thirty until midnight.

Many members expressed themselves as having received a great deal of good from the clinic which was held during the afternoon of the first day. The only participant in this event from out of the State was Dr. G. H. Jungerman of Kansas City, who very ably demonstrated his methods of treating sterility in cattle and delivered a very instructive lecture in connection with his work. The other operators were well-known practitioners in the State.

The entire second day was devoted to the scientific part of the program, the presentation of papers and general discussions. By holding the clinic the first day, which was an experiment, it was possible to continue the program without interruption the second day and kept the members in attendance at the one place until all the program had been completed. This proved so satisfactory that we expect to continue the same plan next year. The round table method of handling subjects of general importance is proving more popular with us every year. The one conducted at this meeting by Dr. Kinsley on "Swine Practice," in which nearly every one present took part, was certainly well worth while.

At the business session thirty-one new members were taken in and the following officers were elected for the coming year:

Dr. P. Philipson, Holbrook, President; Dr. George A. Young, Syracuse, Vice-President; Dr. Carl J. Norden, Lincoln, Secretary-Treasurer. After considerable discussion, Omaha was selected as the place for the next meeting; Kearney and Lincoln being the other cities which extended invitations.

Resolutions were adopted thanking the speakers from outside of the association who so kindly assisted in the program; also expressing appreciation of the work of the local committee and the very generous manner in which the Grand Island Chamber of Commerce

contributed toward making this meeting a success. The resolutions of general interest which were adopted recommended that increased appropriation be made by the State Legislature so as to make it possible to pay indemnity for all classes of cattle which react to the tuberculin test; also that the distribution, sale and administration of tuberculin be controlled.

These resolutions were introduced largely at the request of prominent breeders in the State, and from the attitude of the more important livestock and farm associations in this State, we feel very sure that they are along the right line, and that they will in all probability be enacted in some form during this session of the Legislature.

A very important part of the program at this meeting was an exhaustive exhibit relating to bovine tuberculosis and a more limited one on hog cholera, put on by the Nebraska Bureau of Animal Industry. This exhibit consisted of fresh pathological specimens, permanent mounted specimens and large pictures in colors and illustrated charts properly arranged on large easels. All except the fresh specimens were secured from the U. S. B. A. I. at Washington. This exhibit was thrown open to the general public. The high schools and various clubs were advised of this exhibit and a large number availed themselves of this opportunity to see it. The results were most gratifying, at least so far as could be ascertained from the expressions of many of those who visited the display.

CARL J. NORDEN, *Secretary*.

DEHEMA (IND.) VETERINARY MEDICAL ASSOCIATION

The Dehema Veterinary Medical Association (the association is composed of veterinarians of Delaware, Henry and Madison Counties, Indiana) held its monthly meeting at Dr. Hamilton's Veterinary Hospital, Muncie, Ind., Dec. 15, with a good attendance.

The following officers were elected for the ensuing year: Dr. C. M. Weber, Oakville, President; Dr. C. C. Allen, Selma, Vice President; Dr. R. E. Kepner, New Castle, Vice President; Dr. H. A. Smith, Anderson, Vice President; Dr. H. Meade Hamilton, Muncie, reelected Secretary and Treasurer.

Drs. H. A. Smith and F. A. Moore were appointed on the program committee for the next meeting, the subject being "Swine Diseases."

The meeting adjourned to meet on Feb. 16, 1921, after a general discussion of the following topics: Important Veterinary Legisla-

tion, Indiana State Veterinary Medical Association, Serum Production, Distribution and Use, and the Enforcement of Veterinary Practice Act.

H. MEADE HAMILTON, *Secretary*.

PHILADELPHIA VETERINARY CLUB

A regular meeting of the Philadelphia Veterinary Club was held at the University of Pennsylvania, School of Veterinary Medicine, Tuesday evening, December 21. About thirty members were present. Dr. T. E. Munce, State Veterinarian of Pennsylvania, was the principal speaker. He gave an interesting and instructive talk on the subject of tuberculosis eradication work as being conducted by the State and Federal Governments. The balance of the evening was devoted to a general discussion of this subject. Many questions were asked concerning the various phases of the work and especially in reference to the large number of no lesion cases found in posting animals that have shown well marked reactions to a tuberculin test.

Preceding each club meeting scientific addresses are presented following which there is a general discussion by the men engaged or interested in research work. So far this year there have been four of these lectures given. First was given by Dr. M. J. Harkins on "Immunization against Blackleg." Second by Dr. D. H. Bergey on the "Relation of Streptococci to Diseases of Man and Animals." Third by Dr. J. A. Kolmer on the "Relation of Anaphylaxis Reaction." Fourth by Dr. Paul Lewis on "Tuberculosis with Special Reference to the Complement Fixation Test."

These papers have been followed by lively discussions and have not only been of great interest and benefit to the laboratory men but are well enjoyed by our practitioners.

This section of our program is handled entirely by members of the club engaged in research or laboratory work. An arrangement of this sort has been very successful in bringing in closer contact the practicing veterinarians with the laboratory.

C. S. ROCKWELL, *Secretary*.

MASSACHUSETTS VETERINARY ASSOCIATION

The regular monthly meeting of the Massachusetts Veterinary Association was held at the New American House, Boston, December 22. Dr. A. S. Cleaves acted as chairman. The name of Roy S. Youmans, Methuen, Mass., graduate of New York State Veterinary College, 1914, was acted upon and he was admitted to membership.

Chairman Cleaves, in a few well-directed remarks, introduced Dr.

Edward A. Cahill, Director of the Pitman-Moore Biological Laboratories, Indianapolis, Indiana, who read a paper on "Modern Biologics." This paper proved to be of exceeding value to the members present.

After completion of the paper, lunch was served, after which the members entered into a general discussion of the diseases in which modern biologics are employed. Dr. Cahill showed his familiarity with conditions of this kind by entering very thoroughly into the discussion of each disease. A rising vote of thanks was extended to Dr. Cahill.

HARRIE W. PEIRCE, *Secretary*.

VETERINARY PRACTITIONERS' WEEK, DAVIS, CALIF.

The Annual Short Course for Veterinarians was held at the University Farm, Davis, Calif., under the name of Veterinary Practitioners' Week. The attendance was over 100 and a large percentage of this number was in attendance during the entire week.

The week opened on January 3 with an address of welcome by Dr. C. M. Haring in which he brought out the position that the Veterinary Division of the University of California has been in during the past 10 years. He indicated the great strides of progress that the veterinary profession has made during this period. The earnest coöperation of his Department has surely been deeply appreciated by the practitioners of the State, for without their coöperation and assistance the Annual Short Course which has been held at Davis for the past four years would have been impossible.

Dr. A. T. Kinsley was the first speaker on the literary program and discussed swine management. Other speakers and their subjects were as follows:

Feeding Hogs, J. I. Thompson; Organization and Functions of the State Department of Agriculture, J. P. Iverson; Diagnosis of Swine Diseases, A. T. Kinsley; Foreign Bodies and Impactions of Rumen, J. L. Tyler; Mammitis, J. F. McKenna; Obstetrics, Charles Rey; Judging Sows, E. H. Hughes; Hog Cholera Serum and Its Use, M. Dorset; The Pure Food Law in Relation to Stock Foods and Tonics, C. H. McCharles; Plants Poisonous to Livestock, P. B. Kennedy; Parasitic Diseases of Swine, A. T. Kinsley; Filterable Viruses, M. Dorset; Judging Boars, E. H. Hughes; Diseases of Suckling Pigs, A. T. Kinsley; Infectious Abortion in Swine, F. M. Hayes; Botulism, K. F. Meyer and J. C. Geiger; Judging Beef Cattle, Dairy Cattle and Sheep, R. F. Miller, W. E. Thomson, J. F. Wilson; Proposed Tuberculosis Legislation, J. P. Iverson; Some Conclusions

Drawn from Tuberculin Testing Under the Pure Milk Law, J. Frey; Coöperative Tuberculosis Eradication in Nevada, Edward Records and N. E. Nielson; Complications Associated with Infectious Abortion, L. R. Vawter and Stephen Lockett; Tuberculins, M. Dorset; Rabies, F. L. Kelley; Disinfection and Disinfectants, M. Dorset; Infectious Necrotic Enteritis, A. T. Kinsley; clinic on local and general anesthesia applicable to field cases and demonstration of nerve blocking for dental anesthesia, by J. F. McKenna, H. Phipps and others.

The meeting closed Friday evening, January 7, with a unanimous vote of thanks being extended to Drs. Dorset and Kinsley and to all those contributing to the program and success of the course. On behalf of the veterinarians of the State and those in attendance, Dr. McKenna voiced the appreciative sentiments of the practitioners to the Veterinary Division of the University of California for making it possible to hold such a practitioners' week. Among the veterinarians who traveled a considerable distance to be able to attend this meeting was Dr. Cyril Golding, Kauai, Hawaii. Dr. Golding was formerly a prominent California practitioner, a member of the California State Veterinary Medical Association and a member of the San Joaquin Valley Veterinary Medical Association. Until four years ago, when he left for the Islands, he took an active part in all veterinary affairs of this State. Dr. Golding has charge of the Territorial work on the Island of Kauai, some 90 miles from Honolulu. During the outbreak of anthrax on that Island several years ago he had personal supervision of the work of its eradication.

Dr. Roy Smith of Oregon, was in attendance and there were also a number of Nevada practitioners present.

Major R. Vans Agnew, U. S. Army, now located in San Francisco, was in attendance on the last day and spoke on Army matters pertaining to the veterinarian.

Expressions were heard on all sides from those in attendance that this meeting was one of the most successful short courses for veterinarians ever held in the State. WILLIAM P. JACKSON,

Resident Secretary.

WASHINGTON STATE COLLEGE POST-GRADUATE COURSE

The annual Post-Graduate Course for Veterinarians was held at Pullman, Wash., on January 10 to 14, 1921.

This year's course was the best ever held in the West, not only

from point of attendance (there being about forty veterinarians present), but on account of the prominent men of the profession who were on the program.

Veterinarians were present from Washington, Idaho, Oregon, Montana and British Columbia.

This year the course was given under the auspices of the Veterinary Societies of Washington and Oregon and the State College of Washington. No fee is charged, but that does not mean that the men responsible for the success of the school spared any pains in making the meeting a beneficial one.

Prominent among the men secured to lecture was Dr. A. T. Kinsley of Kansas City, who is acknowledged to be one of our leading authorities on diseases of swine.

The social side of the meeting was well taken care of. On Tuesday evening there was an Alpha Psi initiation. On Wednesday evening those in attendance were entertained at a banquet at which talks were made by Dr. Holland, President of the Washington State College, Dr. S. B. Nelson and representatives of the different States. Those on the program besides Dr. Kinsley were Dr. Lytle, State Veterinarian of Oregon; Dr. P. G. McIntosh of Yakima, Wash.; Dr. B. T. Simms of the Oregon Agricultural College, Dr. Phillips of Mount Vernon, Wash.; Dr. W. L. Johnson of Puyallup, Wash.; Dr. W. G. Moorehouse, Salem, Oreg., and Drs. E. E. Wegner, Otto Menig, H. Beckman, S. L. Brown and J. W. Kalkus of the Washington State College Faculty.

Two afternoons were taken up with a clinic. This was in charge of Drs. McIntosh, Moorehouse and Beckman, who performed several interesting operations. Dr. Simms gave several demonstrations of handling the genital organs in the treatment of sterility. Dr. Lytle gave an interesting lecture on diseases of sheep.

Every one present said before leaving that he would be back again next year, as the course was one that no practitioner could afford to miss.

Dr. E. E. Wegner is to be congratulated on the capable manner in which he arranged the program and for the selection of the men chosen to participate as lecturers. The expenses are borne by the State College of Washington.

Others present were Drs. H. J. Keown, Anson Knight and J. C. Miller of Victoria, B. C.; Drs. H. C. Luce, A. J. Powell and C. H. Seagraves of Idaho; Dr. A. D. Knowles of Montana; Drs. E. R. Derflinger, R. C. Myline and Norman Neilson of Oregon; Drs. J.

H. Bailey, T. A. Elliott, J. R. Fuller, A. R. Galbraith, R. L. Giliam, E. C. Harter, W. A. Jaquiss, J. H. McCoy, L. C. Pelton, C. A. Strandberg, J. J. Stratton, J. Trotter, P. T. Tweed, W. Wilson and J. H. Woodside of Washington.

A. R. GALBRAITH, *Resident Secretary*.

MAINE VETERINARY MEDICAL ASSOCIATION

The first quarterly meeting of the Maine Veterinary Medical Association was held at the Augusta House, Augusta, Me., on January 12. During the morning the members attended sessions of the State Legislature. The business meeting was held at 2 p. m. Twenty-one members answered to roll call. Officers of the association for the ensuing year were elected as follows: President, Dr. W. H. Lynch, Augusta; Vice-President, Dr. C. F. Davis, Rumford Falls; Secretary-Treasurer, Dr. P. R. Baird, Waterville.

A Legislative Committee, composed of Drs. L. S. Cleaves, C. L. Davis, C. F. Dwinal, A. Joly, M. E. Maddocks, and W. H. Lynch, were elected and instructed to frame and introduce a bill in the legislature changing our present law so it will read "Only graduates of veterinary colleges approved by the B. A. I. are eligible to examination of Maine State Board of Veterinary Examiners." The literary program follows: Dr. C. F. Davis, Mastitis of the Cow; Dr. A. J. Neal, A Case Report; Dr. C. W. Purcell, Immunity to Tuberculin; Dr. P. R. Baird, Mineral Deficiency.

Discussion of these papers followed until a late hour. After voting to meet in Bangor, April 13, the meeting was adjourned.

P. R. BAIRD, *Secretary*.

OKLAHOMA VETERINARY MEDICAL ASSOCIATION

The midwinter session of the association was held at the Lee-Huckins Hotel at Oklahoma City, on Jan. 11 and 12. The meeting was called to order and presided over during the session by Dr. T. O. Booth, in lieu of President C. H. Anthony, who was slightly indisposed and out of voice.

Dr. J. S. Grove delivered the welcoming address in which he very fittingly called attention to the good work in the field during the past year by both practicing and official veterinarians in the suppression and control of contagious diseases of livestock. Response was made by Dr. C. C. Hisel, who, it was evident, voiced the sentiment of the seventy-five members present that all felt it was good

to be there. Dr. Hisel also took occasion to stress the effective contagious-disease control work done during the past season.

Dr. C. H. Stam, Chandler, Okla., read an interesting paper on the use of rectal injection of normal saline solution in the treatment of milk fever. An interesting and instructive address on "Sterility in Cattle" was delivered by Dr. G. F. Jungerman, Kansas City, Mo., which brought out general discussion. "Traumatic Pericarditis and Reticulomitis" was handled by Dr. H. A. Roscoe in a manner indicating the speaker's familiarity with his subject.

Dr. H. M. Graefe, Topeka, Kans., interested the veterinarians and furnished much food for thought on the subject of "The Veterinarian an Asset to His Community." Dr. Joe H. Bux, Little Rock, Ark., presented a highly interesting paper on "Anthrax Control in Arkansas." This paper was of peculiar interest on account of the widespread outbreak of this disease in Oklahoma and several adjoining States the past summer. Discussion followed by Drs. E. V. Robinett and L. G. Cloud, State Veterinarians of Oklahoma and Texas, respectively, and by other veterinarians who assisted in suppressing that disease in Oklahoma.

"Parasitic Diseases of Sheep" was Dr. J. E. Guberlet's subject. The Doctor is connected with the A. & M. College at Stillwater, and his paper shows he has done work which is of great value to the practicing veterinarian and sheep raiser, and promises to contribute materially to make Dr. Nelson's slogan, "A Million Sheep in Oklahoma in 1923," come true.

An enjoyable feature of the session was the semi-annual banquet Tuesday night at the Skirvin Hotel. Plates were set for 115 members, their wives and friends. The toastmaster, Dr. John W. Choate, formerly a practicing veterinarian and now the head of the Choate Oil Corporation, made himself famous as a toastmaster by his appropriate introductory remarks.

Dr. Fred Eagle, who, for a number of years has manifested a keen interest in the welfare of the association, was on hand at the eating and was first to respond to a toast. In his remarks he gave the veterinarian some well-received advice on "Service." Harry Blake, President of the Shorthorn Association of Oklahoma, made some complimentary remarks about the good the veterinarian had done and is doing along various lines, especially at this time, by the office of the State Veterinarian in coöperation with the Bureau of Animal Industry, in the accredited herd work.

A feature of the banquet was the presence of a considerable num-

ber of prominent members of the Legislature, now in session. Some were inclined to believe horse meat had been served, but all agreed it was good at that. Most legislators present thought they saw symptoms of the veterinarian wanting special legislation, therefore were very circumspect in their remarks. However, the one lone lady legislator, Hon. Mrs. Lamar Looney, threw off all restraint, and said that if the veterinarians present were a fair representation of the personnel of the profession, she not only would be for any legislation they would ask for, but would be present at the next and subsequent banquets if someone would get word to her of the time and place.

Already popular with the graduated veterinarian, Hon. J. A. Whitehurst, President of the State Board of Agriculture, made himself the ideal head of his Department by an address replete with eloquence, expressive of his appreciation of the support his administration had received from association members, and suggesting for them still larger fields of usefulness to State and society.

The music for the occasion was furnished by Mrs. F. Martin Hill and daughter, and Mrs. Ben Dobkins.

L. J. ALLEN, *Resident Secretary*.

VETERINARY MEDICAL ASSOCIATION OF N. J.

This association held its annual meeting at the Trenton House, Trenton, N. J., on Thursday, January 13, 1921, at which time the following officers were re-elected for the ensuing year:

Dr. Robert E. Mosedale, President, Bernardsville; Dr. H. H. Bair, First Vice-President, Freehold; Dr. J. W. Haffer, Second Vice-President, Paterson; Dr. R. W. Butterworth, Secretary; Paterson; Dr. James McDonough, Treasurer, Montclair.

The next meeting will be held July 14, 1921, at Asbury Park, N. J.

R. W. BUTTERWORTH, *Secretary*.

CONFERENCE FOR VETERINARIANS AT AMES, IOWA

The Sixth Annual Conference for veterinarians, one of the series of Practitioners' Short Courses, was held at Ames, Iowa, January 17 and 18, 1921.

The following program was carried out in detail:

Monday afternoon session: Assembly and registration; "Tuberculosis and Other Diseases of Chickens, Including Demonstrations of Tuberculin Test," Dr. L. Van Es, University of Nebraska; demon-

stration of technique of tuberculin tests in cattle and swine; "Discussion of Factors Influencing Tests," Dr. H. W. Turner, Pennsylvania State Bureau of Animal Industry, Harrisburg, Pa.. Evening session: Address of Welcome, President R. A. Pearson, Iowa State College; Preparation of Tuberculins, Dr. A. Eichhorn, New York City.

Tuesday morning session: Interpretation of Tests Previously Made on Cattle and Hogs, Dr. H. W. Turner and Dr. C. H. Covault; observation of results of tests by all present, followed by general discussion of methods and results, discussion led by Dr. C. E. Cotton, State Veterinarian of Minnesota and Dr. Peter Malcolm, State Veterinarian of Iowa.

Afternoon session: Postmortem lesions shown by animals used in tests and general discussion of relative value of various tests.

Four principal factors contributed to the success of this meeting:

1. Through coöperation with the State Veterinarian and his workers and the State representative of the Bureau of Animal Industry in connection with the work on tuberculosis control, ten cattle which had previously reacted to one or more of the tuberculin tests were secured for the demonstration on cattle. Ten hogs were selected by the use of the test by Dr. W. E. Simonson and twenty-four chickens were selected on clinical evidence.

One goat also known to be a reactor which had been sent to the Research Department by Dr. Golden for further study was also used. It reacted to the ophthalmic and subcutaneous tests and showed lesions in mediastinal glands, lungs, liver and spleen.

Each animal was carefully identified and numbered. A placard bearing the record of the first test and the herd history was placed in front of each animal. The various tests were then applied at the proper time so that they would be ready to observe and interpret on the day of the demonstration. A large chart was prepared giving the temperature of those given the subcutaneous test.

2. The facilities for handling the demonstration contributed very greatly to its success. All of the preparation was done in the Veterinary Hospital and all of the meetings were held in the abattoir of the Agricultural Division. This building is provided with a pit for the animals on one side of which is a large amphitheater and on the opposite side is a modern killing place where the animals were taken for slaughter and post mortem following the interpretation of the tests and were ready for observation of lesions on scheduled time. The B. A. I. provided an inspector who made the usual packing-house inspections for the disposition of the carcasses which was an added point of interest to the audience.

3. For the speakers we were fortunate in securing Dr. L. Van Es, of Lincoln, Nebraska, and Dr. H. W. Turner of Harrisburg, Pa., who had had years of experience in the actual work and who knew how to bring out the valuable points in testing. The discussion was led by Dr. C. E. Cotton and Dr. Peter Malcolm. Their remarks naturally led to an explanation of the State laws and the work on tuberculosis control. At the evening meeting President Pearson gave the audience some new ideas of the work of the college and of the importance of the work of the veterinary profession now and of the greater work in the future. Dr. Eichhorn ably presented the subject of the "Preparation of Tuberculins."

4. The last point offered as an evidence of the success of the meeting is the fact that it was attended by about 300 of the veterinarians of the State. They came early and stayed until the last demonstration revealed the lesions in the goat after which special cars took them bodily to Des Moines for the State association meeting.

H. E. BEMIS, *Chairman.*

IOWA VETERINARY ASSOCIATION

The thirty-third annual meeting of the Iowa Veterinary Association was by special arrangement made a coöperative session with the Sixth Annual Conference for veterinarians arranged by the Veterinary Division of Iowa State College, the conference being one of a series of Practitioners' Short Courses provided by the Iowa State College through special legislative appropriation for the purpose. The two meetings were scheduled for the dates of January 17, 18, 19 and 20, the program of the first two days being held at the college in Ames and the last two days at the Hotel Savery in Des Moines.

The interest of the Iowa veterinarians in the meetings may best be shown by the attendance, approximately 300 veterinarians being present. Marked interest was shown in all sessions of the program. At the close of the Practitioners' Conference at Ames, a special inter-urban train was provided to carry the veterinarians to Des Moines, where a two-day session of the Iowa Veterinary Association opened at 9 o'clock on Wednesday morning.

Following the address of President S. K. Hazlet of Oelwein, Dr. H. W. Turner of the Pennsylvania State Bureau of Animal Industry gave a very interesting discussion on "Tuberculosis Control," using charts to illustrate various points. Dr. R. M. Morten's reports on "Gohn Sachs Bacillary Infection in Swine," which followed, brought

forth considerable discussion relative to practical skin disinfection and the proper technique in the use of various biological products.

On Wednesday afternoon, Dr. Robert Graham of the University of Illinois, gave a very interesting discussion, illustrated by lantern slides, on the subject of "Botulism in the Domestic Animals." Dr. Graham's talk was much appreciated and brought out very interesting discussion. A series of very interesting papers on surgical topics was presented by the various members of the Committee on Surgery. Dr. W. F. Guard of Ames, Chairman of the Committee, presented an interesting paper on "Umbilical Hernias in Swine" presenting his technique, and data compiled from reports received from a hundred or more veterinarians, as to the most successful methods of operating on this condition. Dr. N. A. Kippen of Independence discussed "Surgical Treatment of Traumatic Pericarditis," which was followed by a paper on "Dystokia in Sows" by Dr. C. E. Juhl of Osage, in which methods of delivery other than the Cesarean operation were emphasized. Dr. John Patterson of Hedrick presented an excellent paper on "Treatment of Extensive Burns and the Regenerating of Skin over Granulating Wounds." Dr. Patterson discussed his experiences in the handling of burns of varying degrees in cattle following a fire on a farm in which a large number of very valuable purebred animals were severely burned. A paper entitled "Fractures" was presented by Dr. M. E. Dicken of Washington.

Drs. J. H. Lynch of Fonda and K. W. Stouder of Ames, representing the Committee on Sanitation, discussed problems relative to sanitation, Dr. Lynch emphasizing the matter of proper disinfection of farm buildings and Dr. Stouder that of the value of proper ventilation as a means of disease control.

Thursday forenoon was devoted almost entirely to a business session including reports of the Committee on Legislation by Dr. Peter Malcolm, State Veterinarian, and the Committee on Veterinary Fees by Dr. H. B. Treman of Rockwell City. Following the report of the Executive Committee, sixty new applications for membership were favorably acted upon, which gives the Iowa Association a total active membership of 512. The Secretary-Treasurer's report showed the Association to be in excellent financial condition. The following officers were elected for the new year: President, A. Kaderabek, Fort Dodge; First Vice President, E. A. Buxton, Vinton; Second Vice President, C. W. Anderson, Jewell; Secretary-Treasurer, H. D. Bergman, Ames (reelected); Member of Executive Board, A. L. Wood, Hampton.

Following the business session the day was devoted to papers and discussions as follows:

"Strongyloidosis in Horses" was discussed by Dr. C. H. Covault of Ames, who emphasized the fact that this condition is quite prevalent in Iowa, and discussed the lines of treatment which have seemed most successful. Dr. H. E. Pinkerton of Fort Dodge discussed "Observations on Diseases of Swine."

The Committee on Therapeutics presented the following interesting papers: "The Physiological Action of Pharmaceutical Agents as Determined by Experimental Study," E. R. Steel, Grundy Center; "Therapeutics of the Diseases of Suckling Pigs," H. A. McIntire, Maquoketa; "Treatment of the Common Stomach and Bowel Diseases of Cattle," O. N. Schultz, Latimer; "Therapeutics of the Digestive Tract of the Horse," A. J. Treman, Lake City.

The subject of "Azoturia" was handled in an interesting way by Dr. N. R. Allen of Perry, Dr. Allen emphasizing certain points relative to the proper nursing and symptomatic treatment of this disease. Dr. A. I. Kulp of Adel discussed "Hemorrhagic Septicemia" from the standpoint of the practitioner in the field, emphasizing some of the difficulties encountered by the practitioner in attempting to diagnose and recommend satisfactory means of coping with the disease. Dr. A. Eichhorn of New York City discussed this disease from the laboratory standpoint, including a brief discussion of the various biological products which have been recommended in its control.

No evening sessions were scheduled during the meeting, the evenings being left open for class and group reunions, committee meetings and recreation in general. The open evenings were apparently appreciated and resulted in excellent attendance and good attention during the day sessions.

H. D. BERGMAN, *Secretary*.

THE NEVADA STATE VETERINARY ASSOCIATION

The third annual meeting of the Nevada State Veterinary Association was held on January 20, 1921, at Reno, Nevada.

Dr. Robert Dill, the president, presided. The afternoon session in the Agricultural Building of the University was devoted to business and addresses by Dr. J. Traum of the University of California on "Some Problems in Tuberculosis Control," followed by Dr. Fred Wood of the Cutter Laboratories on "Immunization against Anthrax and Blackleg." The evening session was held at the Riverside Hotel where after a banquet further discussion of the topics of the afternoon was thoroughly enjoyed.

Election of officers for the ensuing year resulted in the election of Dr. George E. Bamberger, of Reno, for president; Dr. Lyman R. Vawter, of the State Experiment Station for vice-president, and Dr. S. Lockett for secretary-treasurer.

During the meeting a resolution approving the Lehlbach Reclassification Bill (H. R. No. 15225) was unanimously passed with instructions to the secretary to place same in the hands of all the Congressional delegates from the State of Nevada. In addition each member promised to do all in his power by individual effort to further the interests of the measure.

Two days later the secretary was able to make an appeal for the bill before the Nevada State Farm Bureau which enthusiastically responded by formulating an appropriate resolution in favor of the same.

S. LOCKETT, *Secretary*.

NECROLOGY

Dr. O. G. Whitestone of Huntington, Indiana, died on October 22, 1920, of chronic heart trouble. Dr. Whitestone was a graduate of the Ontario Veterinary College in 1890, and was admitted to the A. V. M. A. in 1904.

The many friends of Colonel H. E. Bemis will learn with deep sorrow of the death of Mrs. Bemis on December 4, as a result of intestinal obstruction, complicated by heart failure. Mrs. Bemis was deeply interested in charitable work as well as college affairs. Her kindness and hospitality to veterinarians visiting Ames were noteworthy and she will be greatly missed in the college life on account of such genuine cordiality and thoughtfulness of the pleasure and comfort of others. A very kindly sympathy goes to our colleague in his bereavement.

Petaluma Weekly Poultry Journal remarks that the Bureau of Chemistry, Department of Agriculture of Pennsylvania, after an investigation, learned that a Mexico City firm is supplying dried flies for feeding purposes and practically control the export of this insect. The flies are those frequenting aquatic or low, marshy places. The paper adds: "There does not appear to be any reason why these dried flies can not be used to advantage in poultry feeding."

MISCELLANEOUS

GENERAL GORGAS LAUDED

Latin America, Great Britain and France joined with the United States on January 16, in paying tribute to the memory of the late Major Gen. William Crawford Gorgas, former Surgeon General of the United States Army, staunch friend of the Army veterinarian, honorary member of the A. V. M. A., and leader in the successful fight against yellow fever, who died in London last July.

Secretaries Baker and Daniels, Major Gen. Peter C. Harris, Ambassador Jusserand of France, Major Gen. H. K. Bethell, military attaché of the British embassy; Ambassador Pezet of Peru, Minister de Cespedes of Cuba, Minister Elizalde of Ecuador, Chargé d'Affaires Lefevre of Panama and Director General Rowe of the Pan-American Union participated in memorial services in honor of General Gorgas held at the Pan-American Union Building, in Washington, D. C.

The services were under the auspices of the Southern Society of Washington, which thereby honored the memory of a son of the South.

Secretary Baker declared the former Surgeon General of the Army had made the building of the Panama Canal possible and had "saved its construction from being marred by having along its banks the graves of tens of thousands of victims to the pestilence of the jungle, which for ages had imposed the sentence of death upon those who sought to join the two oceans."

General Gorgas' claim to true greatness, Ambassador Jusserand declared, lies in the fact that he gave himself to "world service without thought of fame or self-distinction." General Bethell, speaking for the country in which General Gorgas died, said: "His is the glory of the savior, not the destroyer. Panama is his memorial and his monument."

Panama as a nation paid its tribute through J. E. Lefevre, who declared that the proposed Gorgas Tropical Institute for Research, which may be established by the government of Panama as a tribute to the services of General Gorgas, would be both "a temple to science and a shrine to the great sanitarian."

Minister de Cespedes said the memory of General Gorgas is cherished by the Cuban people, and his name is revered like that

republic's own national heroes and liberators. Minister Elizalde delivered a tribute of appreciation on behalf of Ecuador.

Ambassador Pezet expressed the "undying" gratitude of Peru for the sanitation work done that country under General Gorgas' direction, declaring his death was a particularly severe loss to his nation, as the general had planned to go there to extend and complete the work begun.

THE EWE-NECKED MARE

You have read of the wonderful one-horse shay,
And the deacon who drove on that memorable day;
But little was said of the ewe-necked mare,
The important part of the whole affair.

The deacon got this mare in a swap
With a stranger down at the blacksmith shop.
She was "warranted sound in wind and limb;
Gentle, young, and to go like sin."

He had owned this mare for about a day,
When she ate her fill of musty hay.
Not quite full up—the rest, alas,
Like a toy balloon, was mostly gas.

The deacon led the mare out in the sun
And watched her flanks with an "I dew vum";
The deep, moist grunt with each expiration
Was the cause of his painful exclamation.

He hitched the mare and started off,
But was dreadfully nervous for fear she'd cough.
The mare was willing, but had to stop
To get her breath; she *couldn't* trot.

The old mare coughed! The shay was dust!
As the poet said, every piece had bust.
But it wasn't piled in a neat little mound,
'Twas scattered like ashes all over the ground.

This story is true of the one-horse shay
And the ewe-necked mare that Sabbath day.
If it hadn't been for the heaves, you bet
That sturdy old shay'd been running yet.

N. S. MAYO.

LIVESTOCK ON FARMS AND RANCHES

Nearly ten million less head of livestock were on farms and ranches in the United States on January 1, 1921, than a year preceding. Horses decreased about 602,000 head, or 2.9 per cent; mules decreased 42,000, or 0.8 per cent; milk cows decreased, 298,000, or 1.3 per cent; other cattle decreased 1,880,000, or 4.2 per cent; swine decreased 5,078,000, or 7.1 per cent, and sheep decreased 2,047,000, or 4.3 per cent.

The total numbers on farms and ranches are estimated as follows: Horses, 20,183,000; mules, 4,999,000; milk cows, 23,321,000; other cattle, 42,870,000; swine 66,649,000, and sheep, 45,067,000.

The total value of livestock has declined \$2,271,576,000, or 26.7 per cent during the year; that is, from a total of \$8,507,145,000 on January 1, 1920, to \$6,235,569,000 on January 1, 1921. This decline is due partly to the reduction in numbers, but more to the lower value per head.

Horses, with a value of \$82.45 per head, as compared with \$94.42 a year ago, are lower than they have been since 1906. The total value of horses is estimated at \$1,664,166,000, which is \$298,337,000, or 15.3 per cent less than a year ago.

Mules have declined in price relatively more than have horses, due, probably, to the depression in the cotton States, where mules are largely used. The January 1 price, \$115.72, is the lowest value since 1916, whereas the value a year ago, \$147.07 was the highest on record. The total value of mules is \$578,473,000, a reduction of \$162,927,000, or 22 per cent as compared with a year ago.

Milk cows have declined 24.8 per cent in value per head, from \$85.11 to \$63.97, and in total value have declined \$518,226,000, or 25.8 per cent, from \$2,010,128,000 to \$1,491,900,000. Other cattle have declined 27.3 per cent in value per head, from \$43.22 to \$31.41; and in total value have declined \$587,520,000, or 30.4 per cent, from \$1,934,185,000 to \$1,346,665,000. All cattle have thus declined \$1,105,748,000, or 28 per cent, from \$3,944,313,000 to \$1,934,185,000.

Swine have decreased in value per head 31.7 per cent, from \$19.01 to \$12.99; and in the total value have declined \$497,636,000, or 36.6 per cent, from \$1,363,269,000 to \$865,633,000.

Sheep have decreased in value per head 39.1 per cent, from \$10.52 to \$6.41, and in total value have declined \$206,928,000, or 41.8 per cent, from \$495,660,000 to \$288,732,000.

LIVESTOCK PROBLEMS IN ARGENTINA

The following letter received from a friend in Argentina, who manages a large estancia, gives an interesting account of some problems connected with the livestock industry of that country and the method of meeting them:

"In animals, anthrax in cattle was formerly one of the most difficult problems we had to contend with, but now by using the different serums and vaccines we are well protected. I have used double anthrax vaccine with excellent result. All animals raised on the place are vaccinated and all animals purchased are also vaccinated. I was formerly manager of an estancia of 40,000 acres, of which I had 30,000 acres under alfalfa, carrying from twelve to fourteen thousand head of stock. The mortality from anthrax was only about three per thousand after they had been vaccinated.

"Foot and mouth disease is our one big trouble and it seems to be getting worse. On the alfalfa pasture the mortality was from two to four per cent, but it left four or five per cent cripples and these had to be slaughtered or sold. The worse part of it is that it puts the animals back a month and stops the movement of livestock. Any animals suffering slightly from tuberculosis get worse and the amount of net loss is hard to estimate. The disease appears erratically but nearly always in the spring (September and October). Last year was the worst I have ever observed. It struck all livestock within eight days, but from start to finish we were clear in thirty-five days with very few losses. Many animals, however, did not come back to normal for ten months. This year we are having a mild attack, mostly among calves and yearlings, jumping from one animal to another since the first of September. If it keeps on into November flies will be thick then and will attack their feet. I think our loss will be from six to ten per cent, as it is very difficult to treat these cases. Up to the present we have found no satisfactory treatment for this disease. Our animals are semi-wild and it is necessary to rope and throw them to apply any treatment and as they have a high fever the treatment usually does more damage than good.

"Among swine, anthrax, cholera, and what we call 'small-pox' are the most serious diseases. The pox attacks young pigs from six to ten weeks old. Veterinarians do not seem to be familiar with this disease. The young pigs huddle together and are very drowsy. Some lice will be found on them back of the ears and behind the fore-legs. The pigs break out with small eruptions around the eyes and mouth. They have a high fever and fall away rapidly in flesh. Out of a litter of eight or nine, four or five will be saved but they are put back in growth at least two months. The sows appear in good health and there are no eruptions on the teats. I try to prevent the disease by dipping in cresylic acid dips, 1 to 80. This destroys the lice and assists somewhat, but it must be done every ten days. It is important not to keep many sows together in a pad

dock. When the disease gets started it is hard to check. Sows that farrow in the pasture nearly always escape the disease. Last autumn I turned my pregnant sows into a 30-acre field of corn yielding about 60 bushels per acre, and got 400 strong young pigs, but some of the litters had the disease. Another man near here, who has a herd of three to four thousand young pigs, keeps a sharp eye out for this disease and when found destroys them. This man and I work on the same general lines, using no hog houses and little or no shelter, preferring to raise them in open pastures mostly on alfalfa. I sow rape, oats and barley for winter feed so my hogs always have some legumes.

"Anthrax in swine does not trouble me much, but it is bad in other places and I think it is often confused with hog cholera.

"I know nothing about hog cholera, but it is what I am most afraid of because of the ravages that it has caused in the United States. I went to see some outbreaks on some estancias not far away where the disease practically wiped out the herd, but I am not satisfied that the disease is hog cholera. The swine industry is just starting in this country, and in my humble opinion it is going to develop rapidly, for my experience shows me that we can raise a kilo (2 1/5 pounds) of pork easier than in any other civilized country in the world. The packing companies are also putting up plants that will handle four times as many hogs as they can buy today. In the last three months there has been a boom in price. It is now 80 to 95 cents per kilo, live weight. Our dollar is worth 44 cents, United States gold. In the last two years I have fed and marketed 2,500 hogs. My loss in mature pigs of 50 kilos has not been 3 per cent. In shipping to market I only had one dead animal and two that had to be carted on arrival. This illustrates our excellent railway service in shipping.

"One of the difficulties in using dips in this country is the character of the water that varies from sour, and brackish to salt, hard and soft, and it is essential to have a dip that will mix well with any of these."

N. S. MAYO.

CLINICAL DIAGNOSIS OF TUBERCULOSIS

Physicians everywhere recognize the difficulties in diagnosing the early stages of tuberculosis. The difficulty had been stated 400 years ago by Machiavelli, "In its beginnings the disease is easy to cure but difficult to recognize, but when it continues unrecognized and untreated it becomes easy to recognize but difficult to cure."

The JOURNAL regrets to learn that the publishers of *The Veterinary Review* are reluctantly compelled to suspend publication of their periodical, owing to the present high cost of production.

VETERINARY ASSOCIATIONS

Secretaries of Veterinary Associations are requested to coöperate with us in keep this directory up to date.

Name of Organization	Date of Next Meeting	Place of Meeting	Name and Address of Sec'y.
Alabama Vet. Med. Ass'n.....	.....	Auburn.....	C. A. Cary, Auburn
Alumni Ass'n College of Vet. Med. O. S. U.....	.....	Columbus.....	W. R. Hobbs, care O. S. U Columbus, Ohio
Alumni Ass'n N. Y.-A. V. C.....	Sept., Dec., March	338 E. 26th St.	Adolph Eichhorn, Pearl River N. Y.
Alumni Ass'n U. S. C. V. S.	June.....	Wash., D. C.....	N. S. Mayo, 4753 Ravenswood Ave., Chicago
American Vet. Med. Ass'n.....	Sept. 5-9, 1921...	Denver, Colo.....	R. M. Gow, Little Rock
Arkansas Veterinary Ass'n.....	.....	.....	F. Jelen, Cedar Rapids, Ia.
B. A. I. Vet. Ass'n of Iowa.....	.....	Ames, Ia.....	J. V. Giffey, So. Side, Omaha
B. A. I. Vet. In. A., S. Omaha.....	3d Mon. each mo.	S. Omaha, Neb.....	N. Y.
B. A. I. Vet. Ass'n, Metro. Div.	.....	338 E. 26th St.....	K. Chester, New Westminster B. C.
British Columbia Vet. Ass'n.....	.....	.....	J. P. Bushong, Los Angeles
California State V. M. Ass'n...	June.....	Fresno.....	A. B. Wickware, Ottawa
Central Canada V. Ass'n.....	.....	.....	W. B. Switzer, Oswego
Central N. Y. Vet. Med. Ass'n.....	June and Nov.....	Syracuse.....	A. A. Leibold, Chicago
Chicago Vet. Society.....	2d Tu. each mo.	Chicago.....	I. E. Newsom, Ft. Collins
Colorado State V. M. Ass'n.....	Jan. 20, 1921...	Denver.....	H. B. Brady
Conestoga Veterinary Club.....	2d Thur. each mo.	Lancaster, Pa.....	G. E. Corwin, Hartford
Connecticut V. M. Ass'n.....	.....	.....	Wm. Tennant, Toronto
Dominion Vet. Meat Inspectors' Ass'n of Canada.....	3d Sat. each mo.	Toronto.....	S. E. Houk, Muscatine
Eastern Iowa Vet. Ass'n.....	.....	Muscatine.....	J. H. Taylor, Henrietta, N. Y.
Genesee Valley V. M. Ass'n.....	.....	Rochester.....	W. M. Howell, Valdosta
Georgia State V. M. A.....	.....	Athens.....	W. H. Kelly, Albany
Hudson Valley V. M. A.....	.....	.....	C. V. Williams, Blackfoot
Idaho Ass'n Vet. graduates.....	.....	.....	L. B. Michael, Collinsville, Il
Illmo Vet. Med. Ass'n.....	.....	Collinsville, Ill.....	L. A. Merillat, Chicago
Illinois State V. M. Ass'n.....	.....	.....	G. H. Roberts, Indianapolis
Indiana Veterinary Ass'n.....	.....	.....	H. D. Bergman, Ames
Iowa Veterinary Ass'n.....	.....	Ames.....	W. J. Guilfoyle, Kansas City
Kansas State V. M. Ass'n.....	.....	.....	H. Gieskenmeyer, Fort Thomas
Kentucky V. M. Ass'n.....	.....	Louisville.....	E. I. Smith, Baton Rouge
Louisiana V. M. Ass'n.....	.....	.....	P. R. Baird, Waterville
Maine Vet. Med. Ass'n.....	April 13, 1921...	Bangor.....	Harrie W. Peirce, W. Medford
Massachusetts Vet. Ass'n.....	Monthly.....	American House Boston.....	W. E. Watson, Metamora, O
Michigan-Ohio V. M. A.....	March, 1921.....	Adrian.....	Herbert F. Palmer, Brooklyn
Michigan State V. M. Ass'n.....	Feb. 8-9, 1921...	Lansing.....	C. P. Fitch, St. Paul
Minnesota State V. M. Ass'n.....	Jan. 13-14, 1921...	Minneapolis.....	J. A. Barger, Jackson
Mississippi State V. M. Ass'n.....	Jan. 25-26, 1921...	Canton, Miss.....	R. F. Bourne, Ft. Collins, Col.
Missouri Valley V. Ass'n.....	.....	Omaha, Neb.....	Chas. D. Folse, Kansas City
Missouri Vet. Med. Ass'n.....	.....	.....	A. D. Knowles, Missoula
Montana State V. M. A.....	.....	Butte.....	S. J. Walkley, 945 39th St. Milwaukee, Wis.
Nat'l Ass'n B. A. I. Veterinarians.....	Meet with A. V. M. A.....	.....	C. J. Norden, Lincoln
Neb. Vet. Med. Ass'n.....	.....	Grand Island.....	Lewis H. Wright, Reno, Nev.
Nevada State Vet. Ass'n.....	.....	Reno.....	C. E. Hayden, Ithaca
New York S. V. M. Society.....	.....	Buffalo.....	J. P. Spoon, Burlington
North Carolina V. M. Ass'n.....	.....	.....	R. S. Amadon, Fargo
North Dakota V. M. Ass'n.....	July 13-14.....	.....	C. E. Hershey, Tiffin, O.
North-Western Ohio V. M. A.....	.....	.....	R. I. Bernath, Wauseon
Ohio State V. M. Ass'n.....	Jan. 20-21, 1921...	Columbus.....	Dr. W. R. Lukens, Hillsboro
Ohio Tri-County Vet. Ass'n.....	.....	.....	C. S. Henry, Terre Haute
Ohio Valley Vet. Med. Ass'n.....	.....	.....	H. Wood Ayers, Okla. City.
Oklahoma State V. M. Ass'n.....	Jan. 11-12, 1921...	Oklahoma City.....	B. T. Simms, Corvallis, Ore.
Oregon Vet. Med. Ass'n.....	.....	.....	R. M. Staley, Oak Lane
Pennsylvania State V. M. A.....	Jan. 25-26, 1921...	Harrisburg.....	C. S. Rockwell, 5128 Chestnut St., Phila.
Philadelphia Veterinary Club.....	4th Tu. each mo.	Philadelphia	A. K. Gomez, Manila
Philippine Vet. Med. Ass'n.....	.....	.....	Sam. B. Foster, Portland, Ore.
Portland Vet. Med. Ass'n.....	4th Tu. each mo.	Portland, Ore.....	B. K. McInnes, Charleston
S. Carolina Ass'n of Veter'ns.....	.....	Union.....	C. R. Potteiger, Reading
Schuykill Valley V. M. A.....	.....	Reading.....	S. W. Allen, Watertown
South Dakota V. M. A.....	.....	.....	.....
So. Aux. of Cal. S. V. M. Ass'n.....	3d Wed. Dec., Mar., June, Sept.	Los Angeles.....	J. A. Dell, Los Angeles
Southeastern Michigan V. M. Ass'n.....	2d Wednesday Jan. Apr. Jul. Oct.	.....	H. Preston Hoskins, Detroit
Southeastern States Vet. Med. Ass'n.....	Jan. 24-25, 1921...	Spartanburg, S. C.	J. I. Handley, Atlanta
Southern Tier V. M. A.....	.....	Binghamton.....	R. R. Birch, Ithaca, N.
Southwestern Mich. Vet. Med. Ass'n.....	.....	.....	L. A. Winter, Eau Claire, Mich.

Name of Organization	Date of Next Meeting	Place of Meeting	Name and Address of Sec'y.
Tennessee Vet. Med. Ass'n.....	.....	.....	F. R. Youree, Lebanon
Texas V. M. Ass'n.....	.....	Fort Worth.....	T. T. Christian, Waco.
Utah Vet. Med. Ass'n.....	October, each yr..	Salt Lake City...	Hugh Hurst
Vermont Vet. Med. Ass'n.....	.....	.....	Geo. Stephens, White River Junction
Vet. Ass'n of Alberta.....	July and Dec....	.....	T. E. Leclair, Calgary, Alta.
Vet. Club Dist. of Columbia.....	.....	.....	F. W. Grenfell, Wash'n., D.C.
Vet. Ass'n of Manitoba.....	.....	Winnipeg.....	Wm. Hilton, Winnipeg
Vet. Med. Ass'n of N. J.....	Semiannually....	Asbury Park.....	R. W. Butterworth, Paterson
V. M. Ass'n., New York City..	1st Wed. ea. mo..	338 E. 26th St...	Dr. J. E. Crawford, Far Rockaway, N. Y.
Virginia State V. M. Ass'n.....	.....	Ocean View.....	W. G. Chrisman, Blacks'b'g. Va.
Washington State Col. V. M. A.	1st and 3d Fri. eve	Pullman.....	John H. Gooding, Pullman
Washington State V. M. A.....	.....	.....	Carl Cozier, Bellingham
Washington Vet. Med. Ass'n....	Fri. each week..	Wash., D. C.....	L. C. Wambaugh, Wash., D.C.
Western N. Y. V. M. A.....	.....	Buffalo.....	F. F. Fehr, Buffalo
Western Penn. Vet. Club.....	3d Tu. each mo..	Pittsburgh.....	Fred Wietzel, Pittsburgh
W. Virginia Vet. Med. Ass'n....	.....	.....	C. T. Higginbotham, Charleston
Wisconsin Vet. Med. Ass'n.....	Jan. 19-21.....	Madison.....	W. A. Wolcott, Madison
York Co. (Pa.) V. M. A.....	July 6th and 7th	York.....	E. S. Bausticker, York, Pa.

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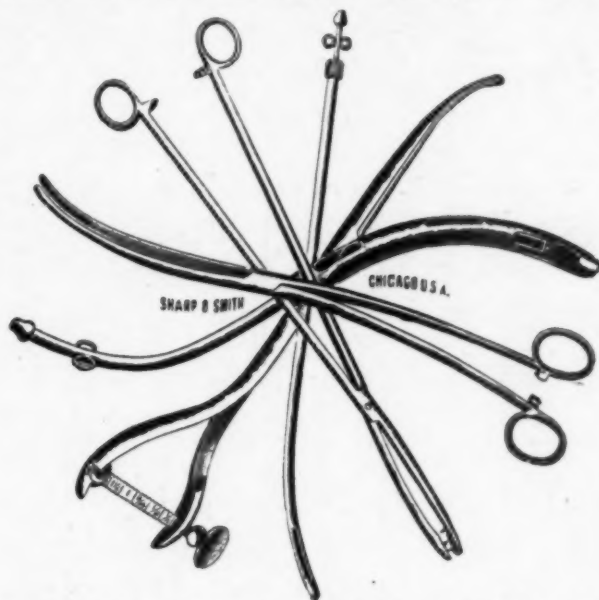
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Fig. V3009—Albrechtsen's medium size Uterine Catheter, double curved, length 14", diameter at point 7/16".....	3.50
Fig. V3011—Albrechtsen's large size Uterine Catheter, double curved, length 25", diameter 3/4".....	5.50
Fig. V3013—Albrechtsen's large size Uterine Catheter, single curved, length 25", diameter 3/4".....	5.50
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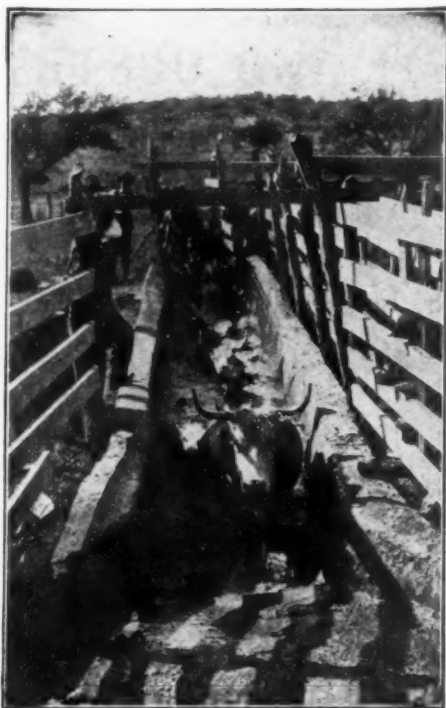
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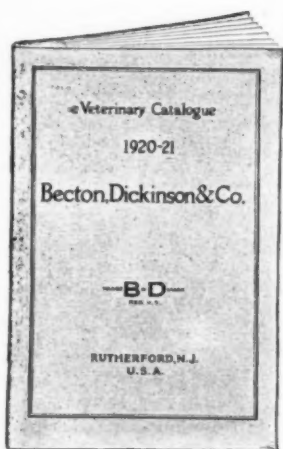
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HEMORRHAGIC SEPTICEMIA COMBINED BACTERIN (Avian)

1 box, 6 ampoules (24 doses)...\$1.50	1 vial, 40 doses.....\$2.00
1 vial, 20 doses..... 1.00	1 vial, 100 doses..... 5.00

SWINE PLAGUE BACTERIN (Hemorrhagic Septicemia Bacterin, Swine)

1 box, 6 ampoules.....\$1.00	1 vial, 10 doses.....\$1.20
1 vial, 5 doses......75	1 vial, 25 doses..... 2.50

American Veterinary Supply Company
Kansas City, Missouri

Oklahoma City, Okla.
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QUALITY BIOLOGIC COMPANY

Producer of

BLACKLEG AGGRESSIN, prepared according to the Kansas method.

BLACKLEG FILTRATE, prepared according to an improved Nitta method.

VETERINARY BACTERINS, prepared according to the Johnson, Keehn method.

All Quality Mixed Bacterins contain a full dose of each individual organism used.

The Quality Mixed Bacterins are in reality combinations of various bacterins, instead of mixtures of a little of this, and a little of that, so as to make an aggregate of about the same number of organisms that is usually put into a bacterin made from a single organism.

Dr. W. G. Keehn late professor of Bacteriology in the Chicago Veterinary College, laboratory director.

QUALITY BIOLOGIC COMPANY

86-88 North James Street
KANSAS CITY, KANSAS.

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Southwestern Serum Company
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Rex Serum & Vaccine Company
St. Joseph, Missouri
Guilfoil Serum Company
Kansas City, Kansas

DISTRIBUTORS

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Kansas City, Kansas
Missouri Valley Serum Company
Kansas City, Kansas
Liberty Serum Company
Ralston, Nebraska
Sioux Falls Serum Company
Sioux Falls, South Dakota
L. T. Williams Serum Company
Indianapolis Indiana

Mixed Infection Bacterin

For Hemorrhagic Septicemia and Mixed Infection in Hogs

6-2 mil. vials formerly \$1.00, now \$.67
20 mil. pkg. formerly \$1.50, now 1.00
100 mil. pkg. formerly \$5.00, now 3.34

INDIANA



COOPER'S Saponified Cresol Solution

50% Pure Cresol

*An officially approved substitute for
Liquor Cresolis Compositus
in disinfection work under B. A. I. control.*

WILLM. COOPER & NEPHEWS

152 W. Huron St.,

CHICAGO, ILL.

Established 1843

Blackleg Products

Germ-Free Blackleg Vaccines

There is no sediment in Cutter's Aggressin

Cutter's Blackleg Aggressin, an undiluted natural tissue extract, germ free and absolutely safe to use. The immunity conferred by it is so persistent that a second vaccination is unnecessary, except as an added precaution with valuable animals.

<u>PRICES</u>	<u>LIST</u>	<u>NET</u>
Five Dose Package (25 c.c.).....	\$1.65	\$.99
Ten Dose Package (50 c.c.).....	3.00	1.80
Fifty Dose Package (250 c.c.).....	12.50	7.50

Sediment in Aggressin is waste matter. Specify Cutter's and you get 100% Aggressin

Cutter's Blackleg Filtrate, a "cultural aggressin" which confers a high but less persistent degree of immunity. It is the best of its type possible to produce, but no "filtrate" or "cultural aggressin" will confer an immunity so persistent as that conferred by a properly prepared undiluted "natural aggressin."

<u>PRICES</u>	<u>LIST</u>	<u>NET</u>
Ten Dose Package (50 c.c.).....	\$ 3.00	\$1.80
Fifty Dose Package (250 c.c.).....	8.00	4.80
Hundred Dose Package (500 c.c.).....	15.00	9.00

Cutter's Anti-Blackleg Serum, for the prevention and treatment of Blackleg, should be used in the control of outbreaks in unvaccinated herds.

<u>PRICES</u>	<u>LIST</u>	<u>NET</u>
100 c.c. Bottle.....	\$4.50	\$2.70
500 c.c. Bottle.....	20.00	12.00

Write for new booklet, "Blackleg Prevention Up-to-date."
We shall be glad to send you a supply with your name and address on them.

Scour

In Calves

Cutter's Anti-Calf Scour Serum is intended to be used in the prophylaxis and treatment of "Calf Scour," or "White Scour," in calves, in which field it has proven extraordinarily successful, as well as in the treatment of Calf Pneumonia.

It is with considerable gratification that we are enabled to report having received letters from veterinarians in widely separated areas claiming better results from Cutter's than from any other Anti-Calf Scour Serum in the treatment of pure bred calves

Prophylactically, for calves, it should be used during the first 48 hours of the calf's life, in doses of 10 to 20 c.c.

Curatively, for calves, it should be used in doses of from 20 to 100 c.c.

<u>PRICES</u>	<u>LIST</u>	<u>NET</u>
Anti-Calf Scour Serum in 10 c.c. bottle.....	\$1.00	\$.60
Anti-Calf Scour Serum in 50 c.c. bottle.....	3.00	1.80
Anti-Calf Scour Serum in 10 c.c. syringe.....	1.25	.75

September 1, 1920

Note New Net Price

We prepay all Shipping Charges

Order from Berkeley, Calif., or 180 N. Dearborn St., Chicago, Ill.

THE CUTTER LABORATORY

Calf Scour Mixed Bacterin

This bacterin will be found useful in the prevention of Calf Scour and Pneumonia where the calves do not sicken during the first week.

It is also useful to supplement the action of the serum, both in prophylaxis and treatment, as the immunity conferred by the vaccine, while not as prompt as that conferred by the serum, is more permanent. Serum followed by vaccine produces prompt and lasting immunity.

The dose of the bacterin is 1 c. c. to 2 c. c. given subcutaneously as soon as possible after birth. A second injection should be given 5 to 7 days later.

<u>PRICES</u>	<u>LIST</u>	<u>NET</u>
Package of six 2 c.c. bottles.....	\$1.50	\$.90
Package of one 20 c.c. bottle.....	2.00	1.20

Mastitis Mixed Bacterin (Bovine)

Indicated in the treatment of Udder Infections.

<u>PRICE</u>	<u>LIST</u>	<u>NET</u>
Package of six 2 c.c. bottles.....	\$1.50	\$.90

Mixed Bacterin (Bovine)

20 c.c. bottle..... \$2.00

For the treatment of mixed infections in cattle especially metritis and allied infections following abortion.

Mixed Bacterin (Rabbits)

A bacterin prepared from B. Cuniculisepticus, Staphylococci, Streptococci and Coliform Bacilli (Rabbit strains) for the prevention and treatment of "Snuffles" in rabbits.

5 c.c. bottle	\$.65
20 c.c. bottle	2.00

DOSE—1 c.c.

The Control of Contagious Abortion

Abortion disease of cattle causes losses to the dairy industry which equal and probably surpass those incurred from tuberculosis. Very few dairy herds of any size escape the infection, with its attendant evils of impaired milk flow, sterility, abortion, difficult parturition, retained afterbirth, and loss of the calf crop

Extensive field experiments conducted in England show that while protection against contagious abortion is afforded by bacterin (suspensions of killed *B. abortus bacilli*) immunization, much better results are obtained where true vaccines (living *B. abortus bacilli*) are employed. The report of the English Commission has been confirmed by experimental work in this country. In addition to better protection from the use of *B. abortus* vaccine, immunization may in most instances be accomplished by a single inoculation. Statistics compiled by the English Commission show that abortions were reduced to less than 4% by vaccination with *B. abortus* vaccine (living organisms).

Immunization—Two products are available for the prophylactic immunization of cattle against Contagious (Infectious) Abortion: *B. Abortus Bacterin*, a sterile suspension of many strains of killed *B. abortus bacilli*, and *B. Abortus Vaccine*, a living culture of many strains of *B. abortus bacilli*.

September 1, 1920

Note New Net Price

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THE CUTTER LABORATORY

Cutter's B. Abortus Bacterin has been extensively employed with satisfactory results for the immunization of cows against abortion disease. It is safe to use and for this reason should always be the choice of the operator for the immunization of animals in herds which do not have a definite history of infection.

Cutter's B. Abortus Bacterin is supplied in packages containing four 2 c. c. bottles, serial dosage. Injections of the bacterin are made subcutaneously in the shoulder or neck region. The content of bottle No. 1 is given first and is followed at an interval of five to ten days by the injection of the content of bottle No. 2. The content of bottle No. 3 is next given and then No. 4, the intervals between injections being the same (five to ten days). It is always best to give the vaccine treatment following parturition or abortion and before breeding. If it is desired to treat infected cows during pregnancy, B. Abortus Bacterin should be employed and the treatment given as early as possible. It is not desirable to begin treatment during the last three months of pregnancy.

Cutter's B. Abortus Vaccine (living culture of B. abortus bacilli) is supplied for use on known infected herds. B. Abortus Vaccine since it contains the living organisms will give a higher and more durable immunity than may be obtained from B. Abortus Bacterin. Only one injection of vaccine is usually required. The vaccine is injected subcutaneously, observing the usual aseptic precautions, in the neck or shoulder region. The dose of Cutter's Abortus Vaccine is 5 c.c. and the treatment should be given following parturition or abortion and before breeding.

Cutter's B. Abortus Bacterin:

	<u>LIST</u>	<u>NET</u>
Package of four 2 c.c. bottles.....	\$1.00	\$.60

Cutter's B. Abortus Vaccine (Living):

	<u>LIST</u>	<u>NET</u>
Package of 50 c.c. (10 doses).....	\$10.00	\$6.00
Package of 10 c.c. (2 doses).....	2.25	1.35

Anthrax

Cure and Prevention

In all localities where Anthrax is prevalent, Cutter's Anthrax Vaccine and Anti-Anthrax Serum are the recognized best insurance against losses from Anthrax.

In certain badly infected territory they gave positive protection where others failed; and wherever used their superiority over others has been established by comparison of results.

To Prevent Anthrax, the Serum-Vaccine simultaneous method is recommended, though users who have had good results year after year from the use of Cutter's Anthrax Vaccine "alone" still continue this practice.

Cutter's Triple Anthrax Vaccine—Specially prepared to protect animals where Anthrax infection is exceptionally virulent and losses occur even among cattle properly vaccinated by the usual methods.

To Cure Anthrax—Thousands of head have been saved during the last four years by the use of Cutter's Anti-Anthrax Serum in virulent outbreaks on badly infected land.

Write for Special Literature concerning these products, which are prepared in our new special Anthrax plant, the largest and most up-to-date in the world, devoted exclusively to the production of Anthrax Vaccines and Anti-Anthrax Serum.

Anthrax Serum Vaccine		
PRICE	LIST	NET
10 complete Immunizing Treatments.....	\$5.00	\$3.00
Double Anthrax Vaccine		
10 doses	1.50	.90
Single Anthrax Vaccine		
10 doses	1.00	.60
Triple Anthrax Vaccine		
10 doses (complete Immunizing Treatments).....	7.50	4.50
Requires Anthrax Serum Vaccine Treatment, followed by Special Spore No. 3 and Spore No. 4.		
Anti-Anthrax Serum		
100 c.c. bottles.....	\$4.00	\$2.70
500 c.c. bottles.....	20.00	12.00

Hemorrhagic Septicemia and Mixed Infection Bacterins for Swine

A Plain Talk About Dosage

The organisms which cause Hemorrhagic Septicemia and Mixed Infection Disease in Swine are of a type that bacterins prepared from and properly representative of the varying strains of organisms concerned cause considerable reaction when given in overdose to susceptible animals.

It is also true of all good bacterins prepared from these organisms that while the proper initial dose will produce a high degree of immunity a second and larger dose, five to seven days later, will increase both the degree and persistence of this immunity. The same may be said of a third dose, but for all practical purposes a second dose is sufficient.

Now it would be very easy for us to follow the line of least (advertising) resistance and dilute our bacterins down to a point where "a liberal dose" (4 c.c. or any other quantity) could also be recommended by us. We could also depend on the very satisfactory results usually obtained from a single dose and say nothing about the desirability of giving a second and larger dose, five to seven days later, when conveniently possible.

But we prefer to give the veterinarian the benefit of the knowledge of these facts so that he may apprise the stock-owner and let him use his own judgment as to whether or not he shall have the second treatment given.

There can be no argument on this point of the advantage of giving a second and larger dose of any prophylactic vaccine, especially as concerns the organisms in question in these diseases.

Cutter's Hemorrhagic Septicemia and Mixed Infections Vaccine (Swine) are of uniformly high bacterial count and are truly representative of the varying strains of the organisms found concerned in the diseases against which they are to be used. Give 2 c.c. (or 3 c.c. to very large animals) in perfect confidence that you are giving all that is necessary to obtain the best results possible to obtain from a single vaccination with any vaccine no matter what the dosage.

If you give a second treatment with any bacterins, the animal is prepared to stand a larger dose than the initial one, and a greater and more persistent immunity will be secured if you double the initial dose.

By giving a larger second dose of a sterile bacterial vaccine (bacterin) you are approximating the results obtained by giving a second dose of a living vaccine (as, for instance, Anthrax Vaccine) that contains living organisms of a higher degree of virulence than those contained in the primary vaccine.

Just keep these facts in mind and you will not be confused by catch-penny talk about "liberal dosage" and, by inference, the consequent lack of necessity of a secondary vaccination.

Even if your client decides that a single vaccination is all that he cares to be bothered with, you will have done your duty by him if you give him the straight facts, and he will have no "come-back," as he might if you said nothing about the desirability of a second treatment.

SUMMARY

Cutter's Hemorrhagic Septicemia Bacterin (Bovine): A sterile suspension of selected strains of *B. bovis* in physiological salt solution. It is a sterile product and may be used with entire safety for the prophylactic immunization of susceptible cattle against hemorrhagic septicemia.

Prophylactic Dose—Give 2 c.c. of bacterin subcutaneously. It should be followed, if possible, by a second injection of 4 c.c. of vaccine five to seven days later.

Cutter's Hemorrhagic Septicemia Bacterin (Sheep): A sterile suspension of *B. Ovis* in physiological salt solution. This vaccine is indicated for the prevention of hemorrhagic septicemia in sheep and goats.

Prophylactic Dose—Give 2 c.c. of bacterin subcutaneously. It should be followed, if possible, by a second injection of 4 c.c. of vaccine five to seven days later.

September 1, 1920

Note New Net Price

We prepay all Shipping Charges

Order from Berkeley, Calif., or 180 N. Dearborn St., Chicago, Ill.

THE CUTTER LABORATORY

Cutter's Hemorrhagic Septicemia Bacterin (Swine): A sterile suspension of *B. suis* in physiological salt solution. This product is indicated for the prevention of hemorrhagic septicemia (swine plague) in swine.

Prophylactic Dose—Give 2 c.c. of bacterin intramuscularly. It should be followed, if possible, by a second injection of 4 c.c. of vaccine five to seven days later.

Cutter's Mixed Infection Bacterin (Swine): A sterile suspension of selected strains of *B. suis*, *B. cholerae suis* (*Suipestifer*), *Coliform* bacilli, *B. pyogenes*, *Streptococci* and *Staphylococci* isolated from cases of mixed infections in swine. The use of Mixed Infection Vaccine (Swine) is advised for the prophylaxis and treatment of swine plague and its complications (mixed infections). Since this product contains not only *B. suis*, but also the important group of organisms so often encountered in the complications following hog cholera and swine plague, usually termed mixed infections, we would advise Veterinarians to select it for general use unless they are certain that the disease with which they are dealing is caused by *B. suis* alone.

All of Cutter's Hemorrhagic Septicemia Bacterins, as well as Cutter's Mixed Infection Vaccine (Swine), are sterile products and may be used without any possible danger of introducing infection. Injections of vaccines in swine should be made intramuscularly with the usual aseptic precautions.

Cutter's Anti-Hemorrhagic Septicemia Serum (Bovine) is a sterile serum prepared from the blood of horses which have been hyperimmunized against many strains of *B. bovis*. It has curative properties and is indicated in the treatment of sick animals. The administration of from 20 to 50 c.c. of this serum will promptly check the spread of the disease among exposed animals in actual outbreaks.

Cutter's Anti-Mixed Infection Serum (Swine) is a sterile serum prepared from the blood of horses immunized against *B. suis*, *B. cholerae suis* and selected strains of *coliform* bacilli all isolated from cases of mixed infection in swine.

When administering serum to swine, make the injections into the loose connective tissue of the armpit, flank, or else deeply

into the muscular tissues. Subcutaneous injections in swine are not satisfactory, as absorption is slow on account of the layer of fat underlying the skin.

Hemorrhagic Septicemia Bacterin (Swine):

	<u>LIST</u>	<u>NET</u>
Bottle containing 20 c.c.....	\$2.00	\$1.20

Mixed Infection Bacterin (Swine):

	<u>LIST</u>	<u>NET</u>
Bottle containing 20 c.c.....	\$2.00	\$1.20
Bottle containing 100 c.c.....	7.50	4.50
Bottle containing 250 c.c.....	17.50	10.50

Hemorrhagic Septicemia Bacterin (Bovine):

	<u>LIST</u>	<u>NET</u>
Package of six 2 c.c. bottles.....	\$1.50	\$.90
Bottle containing 20 c.c.....	2.00	1.20

Hemorrhagic Septicemia Bacterin (Sheep):

	<u>LIST</u>	<u>NET</u>
Bottle containing 20 c.c.....	\$2.00	\$1.20
Bottle containing 100 c.c.....	7.50	4.50

Anti-Mixed Infection Serum (Swine):

	<u>LIST</u>	<u>NET</u>
Bottle containing 50 c.c.....	\$2.00	\$1.20
Bottle containing 250 c.c.....	9.00	5.40
Bottle containing 500 c.c.....	17.00	10.20

Anti-Hemorrhagic Septicemia Serum (Bovine):

	<u>LIST</u>	<u>NET</u>
Bottle containing 50 c.c.....	\$2.25	\$1.35
Bottle containing 500 c.c.....	20.00	12.00

Fowl Cholera Bacterin

For the prevention and treatment of Fowl Cholera or Hemorrhagic Septicemia in Fowls.

Excellent results have been obtained in prophylaxis, and in treatment in the early stages of the disease.

	<u>LIST</u>	<u>NET</u>
10 Doses	\$1.00	\$.60
50 Doses	4.00	2.40
100 Doses	7.50	4.50
250 Doses	17.50	12.50

Chickenpox (or Roup) Vaccine

	<u>LIST</u>	<u>NET</u>
50 c.c. bottle (50 doses).....	\$2.50	\$1.50
250 c.c. bottle (250 doses).....	12.50	7.50

For the treatment of chickenpox or roup in fowl.

Prepared freshly and supplied on order only as desired. Note that this is not a stock package and is *not exchangeable*.

Influenza Mixed Bacterin(Equine)

Prepared from many freshly isolated strains of streptococci (S. Equi) and staphylococci from typical cases of equine distemper and influenza.

Indicated in the prophylaxis and curative treatment of distemper, strangles, influenza, shipping fever, pneumonia, as well as in all complications and sequelæ of these diseases.

<u>PRICES</u>	<u>LIST</u>	<u>NET</u>
Package of six c.c. bottles.....	\$1.50	\$.90
20 c.c. bottle.....	2.00	1.20
Package of 4 syringes.....	3.00	1.80

Anti-Distemper and Anti-Influenza Serum (Equine)

For the prevention and cure of all distemper and influenzal conditions in horses and mules.

<u>PRICES</u>	<u>LIST</u>	<u>NET</u>
10 c.c. in syringe container.....	\$1.00	\$.60
50 c.c. bottle.....	2.50	1.50

Navel Ill Mixed Bacterin (Equine)

This vaccine contains all the organisms usually found concerned in navel infection, including B. Abortus Equi.

<u>PRICE</u>	<u>LIST</u>	<u>NET</u>
Package containing six 2 c.c. vials.....	\$1.50	\$.90

Pneumonia Mixed Bacterin (Equine)

Indicated in the treatment of pneumonia, pleurisy, strangles and influenza.

<u>PRICE</u>	<u>LIST</u>	<u>NET</u>
Package of six 2 c.c. vials.....	\$1.50	\$.90

Polyvalent Mixed Bacterin (Equine)

Indicated in the treatment of all suppurative conditions, as well as in influenzal and catarrhal conditions.

<u>PRICE</u>	<u>LIST</u>	<u>NET</u>
Package of 4 syringes.....	3.00	1.80

The Intradermal Test

IS O. K.

It's Just a Matter of Using the Right Tuberculin
And the Right Tuberculin is Cutter's

Cutter's Intradermal Tuberculin was used in official tests of thousands of dairy cattle in California last year with results more satisfactory than were ever obtained anywhere with any other Tuberculin or any other method of testing.

Try "Cutter's" and verify the certainty of the test and the Tuberculin.

Prices—Intradermal Tuberculin (Purified)	LIST	NET
Pkg. containing four 1 c.c. bottles (sufficient for 20 to 40 tests) ..	\$2.00	\$1.20
Prices—Regular Tuberculin (Subcutaneous)	LIST	NET
25% Solution (ready for use) 5-dose bottles	\$1.00	\$.60
25% Solution (ready for use) 25-dose bottles	3.75	2.25
Syringe containing 1 dose ready to use .....	.50	.30

Cutter's Mallein

Is good enough for Uncle Sam. Thousands of doses have been used in testing horses and mules for Army use.

Intrapalpebral Mallein promises to supersede all other forms.
Try it.

If you have testing to do, use "Cutter's" and be on the safe side.
You can bank on accurate results.

PRICE	LIST	NET
Solution (ready for use) 5-dose bottle	\$1.50	\$.90

For the Ophthalmic Test

PRICE	LIST	NET
Package containing 1 test tablet	\$.25	\$.15
Package containing 5 test tablets .....	.75	.45

For the Intrapalpebral Test

PRICE	LIST	NET
Package containing 4 1 c.c.	\$2.00	\$1.20

September 1, 1920

Note *New Net Price*

We prepay all Shipping Charges

Order from Berkeley, Calif., or 180 N. Dearborn St., Chicago, Ill.

THE CUTTER LABORATORY

CUTTER'S Canine Distemper Bacterin

Prophylactic

Is a suspension of the B. Bronchisepticus for the prevention of Canine Distemper.

It should be administered in 2 c.c. doses at intervals of from 5 to 7 days.

<u>PRICE</u>	<u>LIST</u>	<u>NET</u>
Three bottles, <u>one immunizing treatment</u>	\$1.00	\$.60

CUTTER'S Canine Distemper Bacterin

For Treatment

Is a Mixed Vaccine, containing B. Bronchisepticus, Staphylococcus and B. Coli.

This bacterin has been used with considerable success in the treatment of Canine Distemper. The serum should also be used on valuable dogs.

<u>PRICE</u>	<u>LIST</u>	<u>NET</u>
Six 2 c.c. bottles, in serial dosage.....	\$1.50	\$.90

CUTTER'S Anti-Canine Distemper

Serum

Is especially indicated in the Curative Treatment of Canine Distemper, either alone or in conjunction with the Canine Distemper Bacterin (for Treatment).

The dose is 10 to 50 c.c. according to the size of the dog.

<u>PRICE</u>	<u>LIST</u>	<u>NET</u>
50 c.c. bottle.....	\$2.50	\$1.50
10 c.c. bottle .....	.75	.45

Other Products

Besides the products particularly listed in this issue of the JOURNAL there are a number of other Cutter biologics for the horse, cow, sheep and dog.

Write for new "Therapeutic Index and Price List," and remember that on most of these products you will get straight 40% discount, all shipping charges prepaid.

Dependability

"A good name is rather to be chosen than great riches."

This old text isn't quoted to serve as pious camouflage, for honesty compels us to confess that there are really some sure-enough heathens among us. But it serves better than anything we can think of just now to illustrate the spirit of dependability that more or less unconsciously dominates our whole organization from the most humble worker up.

It has kept us from slighting any step in production, and from rushing on the market with "unseasoned" products. Products that only time could prove of sufficient worth to justify inclusion in the veterinarian's armamentarium.

It has kept us from making extravagant claims regarding the protective values of these new products. But every veterinarian who has had long experience with The Cutter Laboratory products knows that no better biologics are produced and that their special merit lies in their consistent dependability.

This spirit of dependability, and 20 years' experience in conducting high-grade laboratory processes, together with superior location and equipment, guarantee that Cutter products are uniformly the best possible for any laboratory to produce.

Dependability as to quality of products and promptness of service are added assets in your business, if you will let us serve you.

You can use Cutter Bacterial Vaccines in full confidence that high bacterial count is in the vaccine, not on the label; and the same may be said of the organisms represented to be contained in the vaccine. Strains are carefully selected with a view to the greatest polyvalency.

September 1, 1920

Note New Net Price

We prepay all Shipping Charges

Order from Berkeley, Calif., or 180 N. Dearborn St., Chicago, Ill.

THE CUTTER LABORATORY

A New
"CASHWAYCO" PRODUCT

INGREDIENTS FOR MAKING LUGOL'S SOLUTION

Presented in an attractive form and neat package for use in dairies and breeding establishments under the direction of the Veterinarian. *Make Lugol's Solution Fresh. It's Better.*

WHITE ENAMEL IRRIGATOR AND CATHETER

A convenient, practical and useful equipment for irrigating the sheath of the bull before and after each service.

These should be used under your direction in every herd where you supervise this work.

A QUART OF LUGOL'S, A 4 QUART IRRIGATOR WITH HANDLE AND ONE FINEST QUALITY LARGE SIZE, PURE GUM RUBBER CATHETER, COMPLETE TO YOU FOR \$5.75.

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If You Need—

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Drugs or Dips or Disinfectants

Education or Equipment

Position or Practice

Serums or Stationery or Surgical Supplies

Vaccines or Viruses

—Patronize Our Advertisers

Clean Up

Those Aborters!

Do not allow this highly infectious disease to continue to take its annual toll of calves in your community.

The vaccine and bacterin treatments are the **Most Modern** methods of eradicating

Contagious Abortion

This is one of the scourges of the dairy industry today, and the experience of many of our leading practitioners proves that it

CAN BE CONTROLLED

By the use of

Abortion Vaccine (Beebe)

Living Organisms—Single Treatment

Abortion Bacterin (Beebe)

Three doses to one complete treatment.

Put the matter up to your clients at once. It's worth your while.

BEEBE LABORATORIES

(INCORPORATED)

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ANTIPHLOGISTINE

Is a valuable aid to Veterinarians in

EQUINE BOVINE CANINE
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Catheters or Chemicals
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Position or Practice
Serums or Stationery or Surgical Supplies
Vaccines or Viruses

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Prevention and Treatment of Hemorrhagic Septicemia

Three biological products are now available for the prevention and treatment of Hemorrhagic Septicemia in cattle, sheep, and swine:

1. **Bacterin**.—A suspension of *killed* hemorrhagic septicemia organisms, 5000 million per cubic centimeter.

2. **Vaccine**.—A suspension of *attenuated, living* hemorrhagic septicemia organisms, 5000 million per cubic centimeter.

3. **Serum**.—An antiserum derived from the blood of horses hyperimmunized by intravenous injections of living, virulent organisms.

The Bacterin is used for both prophylactic and curative purposes. The Vaccine is recommended for prophylactic purposes only. The Vaccine induces a greater immunizing response than the Bacterin. The Serum is primarily a curative agent, especially when combined with the Bacterin.

Each Bacterin, Vaccine, and Serum is prepared from organisms isolated from the particular genus of animals for which the product is intended.

LIST PRICES: SUBJECT TO DISCOUNT.

Bovine Hemorrhagic Septicemia Bacterin (Single)

Bio. 788. 20-cc vial (5 doses). List price, \$1.50.

Bio. 789. 100-cc vial (25 doses). List price, 4.00.

5000 million killed Bact. bovissepticum per cc.

Bovine Hemorrhagic Septicemia Vaccine (Double)

Bio. 792. Two 20-cc vials (5 doses each). List price, \$2.50.

Bio. 793. Two 100-cc vials (25 doses each). List price, 6.00.

Bacterin (killed organisms) and Vaccine (attenuated organisms), both 5000 million per cc.

Porcine Hemorrhagic Septicemia Bacterin (Single)

Bio. 794. 20-cc vial (5 to 10 doses). List price, \$1.50.

Bio. 795. 100-cc vial (25 to 50 doses). List price, 4.00.

5000 million killed Bact. suissepticum per cc.

Porcine Hemorrhagic Septicemia Vaccine (Double)

Bio. 798. Two 20-cc vials (5 to 10 doses each). List price, \$2.50.

Bio. 799. Two 100-cc vials (25 to 50 doses each). List price, 6.00.

Bacterin (killed organisms) and Vaccine (attenuated organisms), both 5000 million per cc.

Ovine Hemorrhagic Septicemia Bacterin (Single)

Bio. 778. 20-cc vial (5 doses). List price, \$1.50.

Bio. 779. 100-cc vial (25 doses). List price, 4.00.

5000 million killed Bact. ovisepticum per cc.

Ovine Hemorrhagic Septicemia Vaccine (Double)

Bio. 783. Two 20-cc vials (5 to 10 doses each). List price, \$2.50.

Bio. 784. Two 100-cc vials (25 to 50 doses each). List price, 6.00.

Bacterin (killed organisms) and Vaccine (attenuated organisms), both 5000 million per cc.

Anti-Hemorrhagic Septicemia Serum

Bovine—Bio. 935; 100-cc vials; list price, \$4.50. Ovine—Bio. 945; 100-cc vials; list price, \$4.50.

Porcine—Bio. 940; 100-cc vials; list price, \$4.50.

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Parke, Davis & Company

DETROIT

